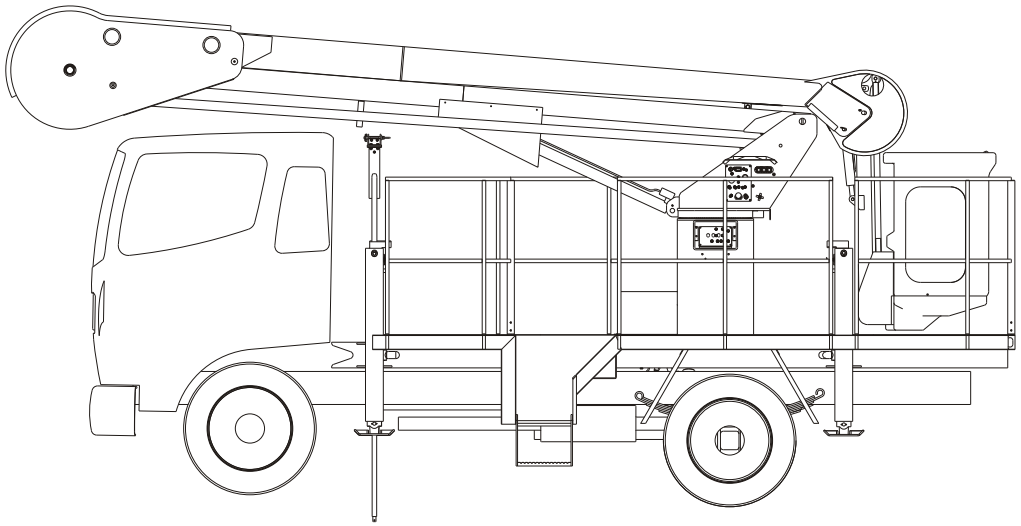
snorkel

EPV16



Gasoline
Battery Electric
Bi-Energy Options

REPAIR PARTS MANUAL

Part Number 13579-2
November 2012 (Rev A)
Version II

Serial Number NZ110412 and after

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■ General Specifications

SPECIFICATIONS	EPV16	
Nominal working height	15.8m	51’ 10”
Maximum height to basket floor	13.8m	45’ 3”
Maximum outreach	7.0m	23’
Maximum outreach height	7.9m	22’ 6”
Nominal Maximum width of base	2m	6’ 5”
Safe working load (unrestricted)	200kg	440lbs
Standard colour	Charcoal base / white booms	
Platform size	1200 x 760 x 1100mm Steel	4’ x 2’ 6” x 3’ 7” Steel
Nominal Travelling height	2.8m	9’ 2”
Nominal Overall length	6.75m	22’ 6”
Turntable rotation	360° continuous	
Insulation rating (Optional)	5KV	
Nominal weight	1700kg	3746lb
Maximum chassis inclination	1.5/1.5 degrees	
Maximum allowable force	400N	
Maximum outrigger load *	2390kg	5269lbs

* This value will change depending on options fitted and the truck model. The value given is an average. Calculate the value or call Snorkel Service if more accurate values are required by ground conditions.

■ Classification

Group B Type 1

■ AS1418.1 Group Classification

C3

■ Commissioning Information

Commissioning of the machine consists of performing the Pre Delivery and Inspection Report (PDIR) satisfactorily.

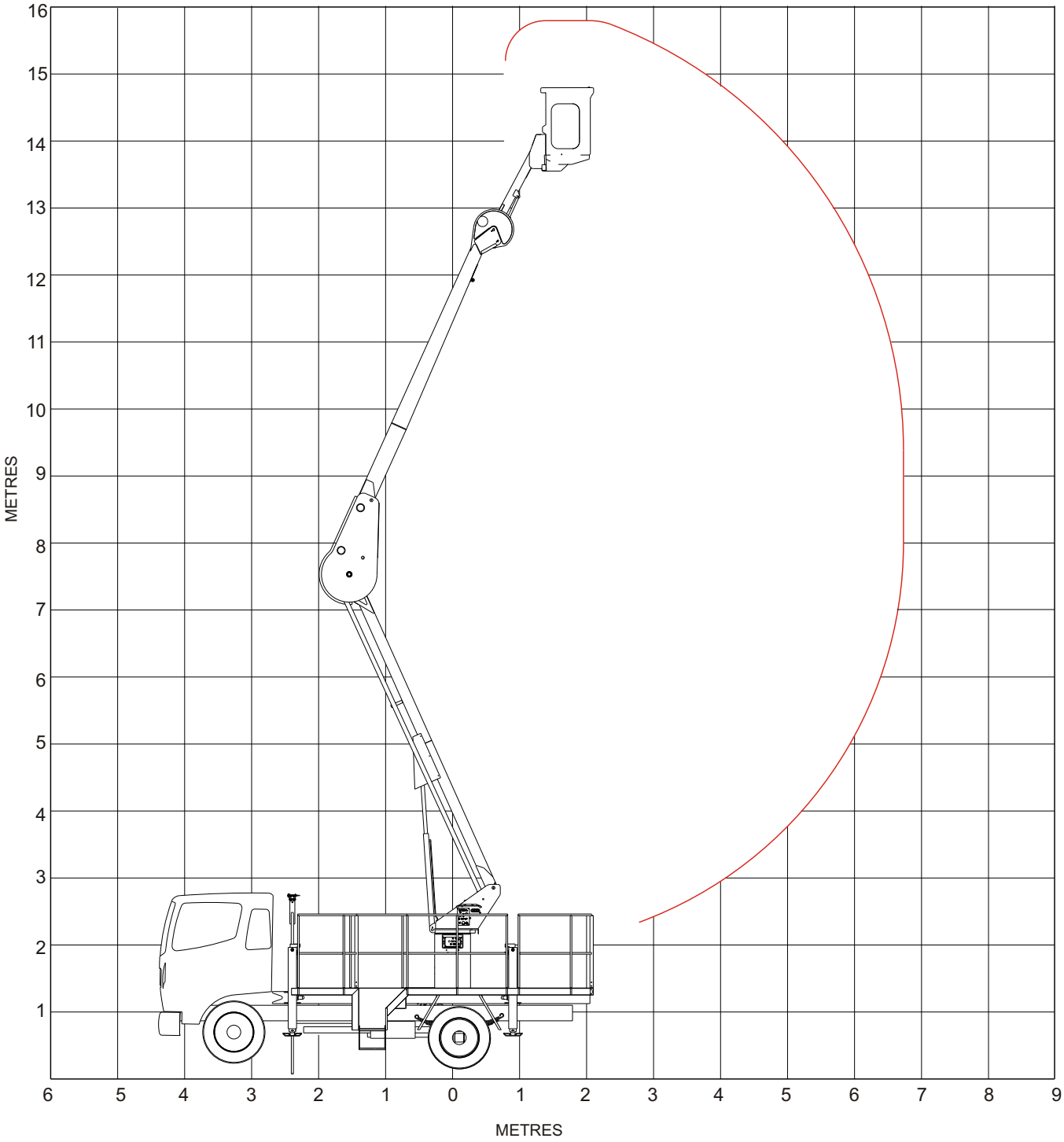
This PDIR is performed by Snorkel or it's agent before the machine is delivered.

A completed PDIR can be obtained, by request, from the salesagent.

■ Engine Specifications

Engine Make	Honda (gasoline)
Model	GX 160
Engine type	4-stroke, over head valve, 1 cylinder
Displacement	163 cm^3 (9.9 cu-in)
Bore x Stroke	68 x 45 mm (2.7 x 1.8 in)
Max. output	4 kW/4,000 rpm
Max. torque	1.1 kg-m (8.0 ft-lb)/ 2500 rpm
Fuel	gasoline
Fuel Grade	automotive gasoline (unleaded or lowleaded preferred)
Fuel consumption	230 g/PSh
Cooling system	Forced air
Ignition system	Transistor magneto
PTO shaft rotation	Counterclockwise
Oil Capacity	0.60 litres (0.60 US qt, 0.53 Imp qt)
Oil Grade	SAE 10W-30

■ Working Envelope



■ Introduction

Units built for the Australian market may be fitted with a 10.9m height restriction kit.

This kit is fitted to allow the maximum height to the platform floor to be restricted to10.9m from the ground.

This is to allow the unit to be operated by unlicensed operators in accordance with Australian legislation.

⚠IMPORTANT

If this machine is fitted with a 10.9m kit you must ENSURE that you read and understand the information in this section.

■ Signage

If the machine is fitted with a 10.9m kit the decal below will be attached to the base/column adjacent to the height lockout switch.

Figure 1 - Decal

■ Operation

When the 10.9m function is selected, via the key switch mounted at the base, the unit operates normally until a micro switch at the knuckle is activated by a cam.

This then powers a solenoid valve that shuts off oil to the upper lift cylinders and prevents the upper boom raising any further.

The key switch ❶ allows the unit to operate normally so the platform floor height is 12.8m (15m working height) when the **DISABLED** position ❸ on the key switch is selected (see on Figure 2).

When the key switch is placed in the **ENABLED** position ❷ the unit is restricted to a platform floor height of 10.9m (see Figure 2). The key can only be removed in the disabled position thus effectively 'locking' the machine into the restricted mode.

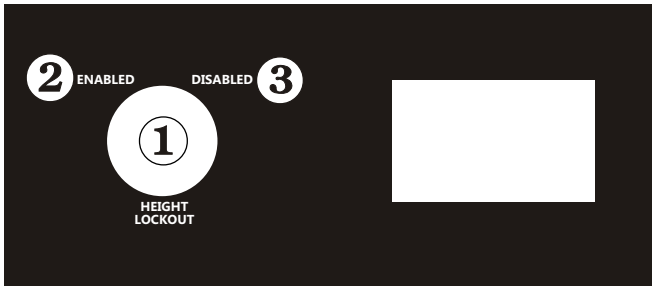


Figure 2 - Key Switch

⚠IMPORTANT

In order to operate this machine in the unrestricted mode (DISABLED) the operator is required to hold a WP Certificate of Competency.

⚠WARNING

The use of a machine fitted with a 10.9m height restriction kit, in the unrestricted (DISABLED) mode by an uncertified operator is a breach of Australian law.

⚠IMPORTANT

If a machine is fitted with a 10.9m height restriction kit, and the machine is to be made available for hire,
IT IS THE RESPONSIBILITY OF THE HIRE COMPANY OR OWNER
to establish that the person hiring the machine, or the person who will be operating the machine, has a WP class Certificate of Competency.

If they do not have such a qualification the machine must be restricted to 10.9m operation and the key must be removed thus locking the unit in that mode prior to the hiree removing the machine.

■ Operation In Unrestricted Mode

If the machine is being operated in the unrestricted (DISABLED) mode, by a suitably qualified operator, the key MUST be switched to restricted (ENABLED) mode and the key removed from the switch any time that the qualified operator leaves the machine.

As previously stated this effectively 'locks' the machine into the 10.9m mode thus preventing any unqualified person from operating the machine in the unrestricted mode.

10.9 Height Restriction

■ Tamper Protection

In order to reduce the likelihood of the machine being tampered with to gain the extra height by an unqualified operator, a tamper protection device is installed on the machine.

This consists of a lockwire and lead seal and the owner must check this on a regular basis to ENSURE that the protective device is in place.

⚠WARNING

If the seal is broken the owner of the machine must:

1. **ENSURE that the 10.9m lockout function still operates correctly.**
2. **Replace the seal.**
3. **ENSURE that the machine continues to meet the requirements of the relevant Australian legislation.**

■ About this Manual:

This Maintenance and Repair Parts manual covers current production machines only.

While Snorkel has attempted in every way to confirm that all information in this manual is correct, improvements are being constantly made to the machine that may not be reflected in this manual.

NOTE:

It is recommended that you record the serial and model number of your machine (see page 11 of this chapter). This information is found on the serial number placard.

■ Manual Organization

The Repair Parts Manual consists of five sections with an individual table of contents preceding sections 1 through 4.

Subassemblies and detailed parts are identified by index numbers on the illustrations that correspond to the item numbers on the parts listing. When requesting any part, always specify complete part number, description, model and serial number of your unit.

The following is a general description of each section and its contents.

❑ General Specifications

The section immediately preceding, contains information relating to the general specifications of the EPV16.

❑ Maintenance

The pages immediately following, contain information as to the maintenance schedules - lubricants and procedures for proper lubrication of the unit.

❑ Repair parts and illustrations

Repair Parts (Section 1), contains parts listings and illustrations for general mechanical repair parts of all major installations and subassemblies of the unit.Hydraulics

❑ Hydraulics

(Section 2), contains parts listings and illustrations of hydraulic components installations including hydraulic schematics and individual components such as cylinders, controls valves and solenoid operated valves.

❑ Electrical

Electrical (Section 3), contains listings and illustrations of electrical components installations including wiring schematics.

❑ Options

Options (Section 4), contains parts listings and illustrations of optional installations that may be installed on your unit.

❑ Parts index - Page locator

The parts index - page locator, identifies the component by name and directs you to the section and page number where you may find information for that part such as its part order number, etc.

■ Maintenance and Schematics

❑ Maintenance information

The parts drawings located in the repair parts sections, are designed for use as a guide for proper disassembly of the machine and components as well as for parts replacement. Always refer to the hydraulic system installation drawings and the electrical wiring diagram before removing or disassembling associated parts.

⚠CAUTION

Do not attempt to disconnect or remove any hydraulic line before reading and understanding all text concerning the system hydraulics. In most cases, disassembly of the machine will be obvious from the illustration.

⚠IMPORTANT

DO NOT modify this ariel platform without prior written consent of Snorkel Engineering Department.

Modification may void the warranty, adversely affect stability, or affect the operational characteristics of the ariel platform.

When disassembling or reassembling components, complete the procedural steps in sequence. Do not partially disassemble or assemble one part, then start on another. Always check your work to assure that nothing has been overlooked.

The following list is a gentle reminder when disassembling or assembling the machine.

- ✓ Always be conscious of weight.
- ✓ Never attempt to lift heavy objects without the aid of a mechanical device.
- ✓ Do not allow heavy objects to rest in an unstable condition.
- ✓ Always make sure work platform is in stowed position - blocked or the weight removed by a suitable lifting device before disconnecting the hydraulic hose from the motor/pump unit to the lift cylinder.
- ✓ When raising a portion of the machine, be sure that adequate blocking is properly positioned - Do not depend on lifting device to hold and secure weight.
- ✓ If a part resists removal, check to see if all fasteners, electrical wiring, hydraulic lines, etc., have been removed or that other parts are not interfering.

Parts should be thoroughly inspected before restoring to service at the time of reassembly. Burrs, nicks or scratches may be removed from machined surfaces by honing or polishing with #600 crocus cloth, followed by a thorough cleaning in an approved cleaning solvent, and blown dry with compressed air. Do not alter the contour of any part. If this operation does not restore the part to a serviceable condition, replace the part.

Replace all O-rings, seals, and gaskets at reassembly. Use new roll pins or cotter pins. Dip all packing rings and seals in hydraulic oil before reassembling in cylinder and manifold installations. Replace any part having imperfect threads. In general, units that have been disassembled can be reassembled by reversing the order of disassembly.

Remember that the service life of a machine can be increased by keeping dirt and foreign materials out of the vital components. Precautions have been taken to safeguard against this; shields, covers, seals and filters are provided to keep air and oil supplies clean; however, these items must be maintained on a scheduled basis in order to function properly.

At any time air or oil lines are disconnected, clean surrounding areas as well as the opening and fittings themselves. As soon as a line or component is disconnected, cap or cover all openings to prevent the entry of dirt or foreign materials.

New parts should remain in their container until they are ready to be used.

Clearly mark or tag hydraulic lines and electrical wiring connections when disconnecting or removing them from unit. This will assure that they are correctly reinstalled.

Proper assembly is critical to the successful rebuilding of any unit. Carefully inspect any parts which are to be reused. If in doubt, replace.

"SAFETY FIRST" is a good slogan.

Replace any guards and protective devices that have been removed to carry out maintenance and repair work.

■ Maintenance schedules

Snorkel has established a Preventive Maintenance Schedule that includes:

- ✓ Daily Maintenance (Operator's Inspection)
- ✓ 90 Day or 150 Hour (frequent) Maintenance
- ✓ Yearly or 500 Hour (annual) Maintenance,

These schedules should ensure the detection of any defective, damaged or improperly secured parts and provide information regarding lubrication and other minor maintenance items.

The Maintenance Schedule following, outlines the requirements of these maintenance checks for each time interval. The Operator's Pre-operational inspection must be performed by a trained operator. All other maintenance and inspections must be performed by a trained service technician only.

Note that the 90 Day or 150 hour (frequent) and yearly or 500 hour (annual) Maintenance, require use of the Preventive Inspection Maintenance Checklist to pinpoint all inspection items. Retain a copy of these forms for your records.

They also require that all placards and decals on the unit are to be inspected.

All placards and decals must be in place and legible. Use the placards installation drawing and parts listing in the repair parts section 1 of this manual to check these placards and decals.

Snorkel recommends that you make additional copies of the Preventive Inspection Maintenance Checklist forms for your use in performing these

⚠ DANGER

Failure to perform the Preventive Maintenance at the intervals outlined in the Maintenance Schedule may result in a unit being operated with a defect that could result in INJURY or DEATH of the unit operator. DO NOT allow a unit to be operated that has been found to be defective.

Repair all defects before returning the unit to service.

■ Daily Maintenance

❑ Pre-operational Inspection

Item	Service Required
Stabiliser/boom interlock tests	Perform tests to ensure that the system is functioning
Engine fuel level	Look to see that the fuel tank is full
Fuel tank cap	Check to see that the cap is tight
Engine oil level	Check oil level (between dipstick lines)
Fuel leaks	Visually inspect (hoses and connections)
Engine cooling	Check that grills are not blocked
Wiring harnesses	Visually inspect (installation, condition)
Battery terminals	Visually inspect (no corrosion)
Battery fluid level	Check fluid level (1/4" or 6 mm below filler neck)
Hydraulic oil level	Visually inspect level (between lines on gauge)
Hydraulic oil leaks	Visually inspect (hoses, tubes)
Bolts and fasteners	Visually inspect (condition)
Structural damage and welds	Visually inspect (weld cracks, dents)
Lanyard anchor points	Visually inspect (condition)
Platform gravity gate	Check condition and operation
Platform guardrails	Visually inspect (condition)
Flashing light (option)	Visually inspect (operation)
Ground control switches	Actuate and inspect for proper operation
Ground control valve levers	Check operation (causes correct motion)
Emergency lower	Check operation (causes correct motion)
Platform control box switches	Actuate and inspect for proper operation
Platform control valve levers	Check operation (causes correct motion)
RCD/ELCB AC outlet (option)	Check operation
Platform work lights (option)	Check operation
Placards and decals	Visually inspect (installation, condition)

■ Hydraulic Hose Age

Hoses used in Snorkel production units are manufactured by Hydraulink, Parker and Eaton and have a code stamped on them that offers the following information.

Hydraulink Sample Hose Code **2-2005 lot 050519/10**

Month of Manufacture — **2** – **2005** **lot 050519/10** — Lot number

Year of Manufacture

Parker Sample Hose Code **11- 4Q 99**

Manufacturing Plant Number — **11** - **4Q** **99** — Year of Manufacture

Manufacturing Period (i.e. 4th Quarter)

Eaton Sample Hose Code **2Q 06**

Manufacturing Period (i.e. 2nd Quarter) — **2Q** **06** — Year of Manufacture

■ 90 Day or 150 Hour Maintenance (Trained Service Technician)

Components	Service Required	Recommended Lubricant or Further Instructions
Daily maintenance	Perform maintenance as per schedule	
Preventive inspection maintenance checklist	Perform inspection, complete form	Retain copy of checklist
Placards and decals inspection	Inspect using drawing and parts listing in section 1 (repair parts)	Replace any missing or unreadable decals/placards
Rotation bearing	Lubricate	Conoco Super Sta #2 Above 32° Mobilgrease CM-P Below 32° Mobilgrease CM-L
Rotation bearing teeth & pinion	Lubricate	Conoco Super Sta #2 Above 32° Mobilgrease CM-P Below 32° Mobilgrease CM-L
Platform rotator	Check smooth operation	Repair or replace if not working properly
Platform controls	Check smooth operation & speeds	
Battery	Check specific gravity	1.260/1.275 at 27° C.
Hydraulic filter	Check condition	Replace if dirty
Engine RPM	Check for proper engine RPM (3000)	See engine manufactures owner's manual
Engine oil	Replace per engine owners manual	

■ Six Monthly (Trained Service Technician)

Components	Service Required	Recommended Lubricant or Further Instructions
Over-centre valve	Inspect and service	
	Lubricate Plunger and bore	General purpose greaser

■ Yearly or 500 Hour Maintenance (Trained Service Technician)

Components	Service Required	Recommended Lubricant or Further Instructions
90 day or 150 hour maintenance	Perform maintenance per schedule	
Hydraulic oil reservoir	Clean and replace fluid	Shell Tellus 32 or similar
Hydraulic filter	Replace	After 1st. 50 hours, thereafter at recommended interval
Hydraulic pressures	Check pressures	

■ Lubricants

To obtain maximum life of any industrial equipment, a well planned maintenance programme should be followed. The information provided on these and preceeding pages is intended to provide guidelines for proper lubrication, however, some operating conditions will require more frequent checks and lubrication than listed - for example applications with much dust or moisture will require modification of the schedule to fit that particular application.

The use of high grade lubricants and fluids should be encouraged. Sources of these lubricants may be from almost any of the oil companies. Those listed are typical and any lubricant with equal specifications may be used. However if in doubt regarding the use of lubricants other than those listed, contact Snorkel.

❑ Pressure gun application

Service all fittings as indicated in the Maintenance Schedule and lubrication illustration. Wipe away all excess lubricant from exposed surfaces. Over lubrication can collect dirt and foreign matter which acts as an abrasive. Lubrication of accessory equipment should be in accordance with the manufacturer's recommendations.

❑ Rotation bearing

Rotation bearing. Pressure gun lubricate bearing at recommended interval using lubricant as outlined in the maintenance schedule. Rotate while lubricating.

❑ Rotation gear teeth and pinion

Rotation gear teeth and pinion. Gear teeth and gear box pinion should be lubricated with a open gear grease.

❑ Engines

Engine. Refer to the engine manufacturer's instruction manual or consult your local engine service representative if engine adjustments or repairs are needed. The engine MUST be operated in accordance with manufacturer's instructions and serviced at recommended intervals.

❑ Hydraulic oil reservoir

Hydraulic oil reservoir. The fluid level should be kept between the low and full marks on the dipstick and should be checked with all cylinders fully retracted and the platform in stowed position.

The interior of the reservoir should be wiped out and cleaned each time the hydraulic oil is changed. It is absolutely necessary that only new, clean hydraulic oil is added.

⚠CAUTION

If it becomes necessary to add or use an oil other than the recommended fluid, it is important that it be compatible and equivalent to the factory fill. Local oil suppliers can generally furnish this information.

If questions still remain, contact Snorkel for further information.

❑ Filling hydraulic system

This procedure must be followed when starting up a new machine or after any major service affecting the hydraulic system when a considerable volume of oil may have been drained from the system.

⚠IMPORTANT

It is most important that the machine is not operated unless the lower boom cylinder is completely filled with oil.

It is also advisable to follow this procedure if there is any doubt about the condition of the machine, i.e. if it has been standing idle for more than a week, or as a safeguard, when a new operator is taking charge of the machine.

NOTE - Air in Oil

If a cylinder is empty, filling it will cause the level in the reservoir to fall and may result in air being discharged from the cylinder into the tank.
In this event, when the cylinder is fully extended the engine should be stopped to allow the air to separate from the oil (about five minutes is sufficient) and the oil topped up again before restarting the engine.

1. Fill the reservoir with the recommended hydraulic oil. Leave the filler cap off so that any drop in the oil can be seen.
2. Lower the stabiliser legs to the operating position.
3. Raise the lower boom halfway.
4. Lower the lower boom and raise the hydraulic legs.
5. Check the oil level as in ❶.
6. Lower stabiliser legs to operating position.
7. Raise the lower boom fully then raise the upper boom fully.
8. Rotate the turntable through 360°.
9. Lower all booms and raise the hydraulic legs.

10. Check the oil level as in ❶.

The machines hydraulic system is now correctly filled.

NOTE - Oil Seals:

It is best to leave oil seals undisturbed if the machine is operating satisfactorily. If replacement of seals is necessary, extreme care must be taken not to damage the surface of the seals, cylinder bore or the chrome plated piston shaft.

- Absolute cleanliness is essential.

⚠CAUTION

At all times when a cylinder is stripped down make sure that the cylinder bore and the piston rod are not damaged in any way. Particular care is necessary that the cylinder head nut is not allowed to drop off the head and damage the chromium plated shaft.

If questions still remain, contact Snorkel for further information.

■ Over-Centre Valve

The over-centre valve is factory set and should not need adjusting unless it is knocked or the booms or levelling system is dismantled.

The over-centre valve should be checked six monthly. This can be done by levelling the trailer to the level bubble, and levelling the lower boom.

Observe the over-centre valve operation while raising the upper boom only. As the roller on the over-centre valve reaches the flat of the cam on which it travels, ensure that the roller extends, to actually roll on to the flat of the cam, and is not seized within the over-centre valve.

At this point the upper boom should not raise any higher, and the angle of the upper boom must not exceed 65^{o}.

In this position the lower boom should not be able to be lowered until the upper boom is lowered.

The over-centre valve does not require regular maintenance apart from checking as detailed above.

⚠WARNING

It is important that if either the levelling system or engine speed is adjusted, the over-centre valve setting must be checked afterwards.

■ Battery

Battery. The battery will have longer life if the water level is maintained and it is kept charged. The unit will have better starting characteristics with a fully charged battery.

In cold weather the battery should be maintained at full charge to keep from freezing. An extremely low or dead battery can freeze in cold weather. Make sure connections are clean and tight.

Make sure charging equipment is operating properly.

⚠DANGER

Lead-acid batteries contain sulfuric acid which will damage eyes or skin on contact. When working around batteries, ALWAYS wear a face shield to avoid acid in eyes.

If acid contacts eyes, flush immediately with clear water and get medical attention.

Wear rubber gloves and protective clothing to keep acid off skin, if acid contacts skin, wash off immediately with clear water.

Lead-acid batteries produce flammable and explosive gases. NEVER allow smoking, flames or sparks around batteries.

■ Preventive inspection maintenance 90 day or 150 hour checklistl

OK	OK - No Service Required
✔	Corrective Action Required
X	Corrected, (Record description of corrective action).

Serial Number _____

Inspection Procedures Codes
(1) Weld cracks, dents and/or rust
(2) Installation
(3) Leaks
(4) Operation
(5) Condition
(6) Tightness
(7) Residue buildup
(8) See placards and decals inspection chart

Check	OK	✔	X
Chassis			
Structural (1)			
Hydraulic tubes and hoses (3,5)			
Decals and placards (2,8)			
Battery disconnect switch (4)			
Lubrication points			
Pins, pin keepers (2)			
Turntable			
Structural (1)			
Swivel mount assembly (2,3)			
Hydraulic tubes and hoses (3,5)			
Wire harness (2,5)			
System pressure (Max 2800 psi)			
Lubrication points			
Emergency bleed down valve (4,3)			
Engine (2,4)			
Engine charging system (4)			
Engine air filter (5)			
Hydraulic pump (4)			
Engine oil (5)			
Electric choke (4)			
Hydraulic oil reservoir (2,3,5)			
Hydraulic oil reservoir filler/breather cap (2,6)			
Hydraulic oil reservoir fluid level (5)			
Hydraulic oil filter (3,4)			
Pins, pin keepers (2)			
Slew ring bolts (2,6)			
Lower Booms			
Structural (1)			
Boom lift cylinder pin (2,6)			
Boom lift cylinder and holding valve (3,4)			
Hydraulic tubes and hoses (3,5)			
Electrical Wires (5,2)			
Upper Booms			
Structural (1)			
Electrical wires (5)			
Jib cylinder pins (2,6)			
Jib cylinder and holding valve (3,4)			
Hydraulic hoses and tubes (3,5)			
Decals and Placards (2,8)			
Boom lift cylinder pins			

Check	OK	✔	X
Boom lift holding valve) (3,4)			
Platform			
Structural (1)			
Decals and placards (2,8)			
Platform gate (4)			
Hydraulic tubes and hoses (3,5)			
Platform mounting bolts (2,6)			
Correct operator's manual in document holder (2)			
Correct operation of tail lights, indicators (4)			
Battery			
Battery terminals (6,7)			
Battery electrolyte level (5)			
Fuel Tank			
Fuel tank (3,5)			
Fuel tank cap (2,3,4,5)			
Ground Control Station			
Station selector switch @ ground controls platform controls DO NOT work (4)			
Station selector switch @ platform controls ground controls DO NOT work (4)			
Cold start (4) Choke			
Keyed master switch (4)			
Boom speed rheostat switch (4) *Electric Controls Only*			
Turntable rotation (4)			
Upper boom lift UP - DOWN (4)			
Lower boom lift UP - DOWN (4)			
Jib boom lift UP - DOWN (4) *Electric Controls Only*			
Emergency stop (4)			
Over-centre valve (4,2)			
Interlocks			
Booms will not raise with legs stowed (4)			
Legs will not raise with booms up (4)			
Platform Control Station			
Foot switch (4) *Electric Controls / Hydraulic Controls Option*			
Foot switch, functions operate when engaged (4)			
Start switch (4)			
Cold start (4) Choke			
Boom speed rheostat switch (4) *Electric Controls Only*			
Turntable rotation (4)			
Upper boom lift UP - DOWN (4)			
Lower boom lift UP - DOWN (4)			
Jib boom lift UP - DOWN (4)			
Emergency stop (4)			
Optional Equipment			
Air line to platform (2,4)			
Dual fuel system (2,4)			
Platform work lights (2,4)			
Platform rotation (4)			
Platform Rotator			
Platform rotation holding valve (3,4)			
Rotator mounting bolts (2,6)			

Corrective Action Required

Note: If correction action is required on any item, attach sheet indicating problem and action taken.

All items have been properly checked and tested and found to be operating satisfactory or necessary corrective action has been completed.

Inspected By: _____ Date _____

■ Torque chart

NOM SIZE X PITCH	TENSILE STRESS AREA A_s (mm^2)	PROPERTY CLASS 8.8			PROPERTY CLASS 10.9		
		CLAMP LOAD W (N)	TORQUE (N.m)		CLAMP LOAD W (N)	TORQUE (N.m)	
			DRY k=0.20	LUBED k=0.15		DRY k=0.20	LUBED k=0.15
M3 x 0.5	5.03	2 200	1.32	0.99	2 990	1.79	1.34
M3.5 x 0.6	6.78	2 960	2.07	1.55	4 030	2.82	2.11
M4 x 0.7	8.78	3 830	3.07	2.30	5 220	4.17	3.13
M5 x 0.8	14.2	6 200	6.20	4.65	8 430	8.43	6.33
M6 x 1	20.1	8 770	10.5	7.90	11 950	14.3	10.8
M8 x 1.25	36.6	15 975	25.6	19.2	21 750	34.8	26.1
M8 x 1	39.2	17 100	27.4	20.5	23 275	37.3	27.9
M10 x 1.5	58.0	25 325	51	38.0	34 450	69	52
M10 x 1.25	61.2	26 725	53	40.1	36 350	73	55
M12 x 1.75	84.3	36 800	88	66	50 075	120	90
M12 x 1.25	92.1	40 200	96	72	54 700	130	98
M14 x 2	115	50 200	140	105	68 300	190	145
M14 x 1.5	125	54 550	155	115	74 250	210	155
M16 x 2	157	68 525	220	165	93 250	300	225
M16 x 1.5	167	72 900	235	175	99 200	320	240
M20 x 2.5	245	106 950	430	320	145 550	580	435
M20 x 1.5	272	118 750	475	355	161 550	650	485
M24 x 3	353	154 100	740	555	209 700	1 010	755
M24 x 2	384	167 600	805	605	228 100	1 100	820
M27 x 3	459	200 350	1 080	810	272 650	1 470	1 100
M27 x 2	496	216 500	1 170	875	294 600	1 590	1 150
M30 x 3.5	561	244 900	1 470	1 100	333 250	2 000	1 500
M30 x 3	580	253 150	1 520	1 140	344 500	2 070	1 550
M30 x 2	621	271 050	1 630	1 220	368 850	2 210	1 660
M33 x 3.5	694	302 950	2 000	1 500	412 250	2 720	2 040
M33 x 2	761	332 200	2 200	1 640	452 050	2 980	2 240
M36 x 4	817	356 600	2 570	1 930	485 300	3 490	2 620
M36 x 3	865	377 600	2 720	2 040	513 800	3 700	2 780
M39 x 4	976	426 000	3 320	2 490	579 750	4 520	3 390
M39 x 3	1 028	448 700	3 500	2 630	610 650	4 760	3 570
M42 x 4.5	1 121	489 300	4 110	3 080	665 850	5 590	4 200
M42 x 3	1 206	526 400	4 420	3 320	716 350	6 020	4 510
M45 x 4.5	1 306	570 050	5 130	3 850	775 750	6 980	5 240
M45 x 3	1 398	610 250	5 490	4 120	830 400	7 470	5 610
M48 x 5	1 473	642 950	6 170	4 630	874 950	8 400	6 300
M48 x 3	1 604	700 150	6 720	5 040	952 800	9 150	6 860

Grade marking 

■ To order service or repair parts

When placing an order for service or repair parts, please have the following information available for your machine.

- ✓ Machine model number
- ✓ Machine serial number
- ✓ Snorkel part number
- ✓ Description of part
- ✓ Quantity of parts required
- ✓ Your purchase order number
- ✓ Address for order to “Ship To”
- ✓ Your desired shipment method

All correspondence relative to this unit, such as field reports, discrepancy reports, requests for service information, etc., should be directed to:

Snorkel New Zealand
36 Bruce Road
P.O. Box 1041
Levin 5510
New Zealand

Phone: +64 06 368-9168
Fax: +64 06 368-9164

Attention: Parts Department

❑ ANSI and OSHA compliance

All owners and users of the aerial platform must read, understand, and comply with all applicable regulations. Ultimate compliance to OSHA regulations is the responsibility of the user and their employer.

ANSI publications clearly identify the responsibilities of all personnel who may be involved with the aerial platform. A reprint of the “Manual of Responsibilities for Dealers, Owners, Users, Operators, Lessors and Lessees of ANSI/SIA A92.5-1992 Boom-Supported Elevating Work Platforms” is available from Snorkel dealers or from the factory upon request.

Copies are also available from:

Scaffold Industry Association
20335 Ventura Blvd. Suite 310
Woodland Hills, CA 91364-2471 USA

❑ Manuals

Manuals are available from Snorkel to support any of the machines that we produce.

The specific manuals for EPV16 are as follows:

- ✓ Operator’s Manual
  Snorkel part number - 13642-1

- ✓ Repair Parts Manual
  Snorkel part number - 13642-2

■ Product Warranty

For full terms of your warranty policy refer to the rear of this manual after the Index section, or check with your Snorkel distributor, or check the Snorkel website.

Record machine information here:

Model number*

_____

Serial number*

_____

Date of purchase

_____

Purchased from

_____

Snorkel dealer or distributor

_____

* This information is found on the serial number placard attached to your machine.

■ Stability Testing EPV16

❑ Introduction

The purpose of this test is to assess if the EPV16 meets the requirements of AS 1418-10 2004 Appendix G Stability Calculations. The situation for minimum stability is with the booms at maximum outreach over the cab, with the maximum rated load in the platform, a manual force pulling toward the cab and maximum wind load acting on the knuckle of the booms or with the booms at maximum outreach over the side, with the maximum rated load in the platform, a manual force pulling over the side and the maximum wind load acting on the knuckle of the booms.

Since this testing involves taking the machine to the edge of its stability envelope care must be taken to ensure the test is failsafe i.e. the machine can not tip over if it fails the test. To this end the machine is to be chained to a suitabily strong anchor but with enough slack in the chains so as not to assist the stability of the machine. If the machine starts to tip over the chains will pull tight, so that the machine can not continue to tip over.

❑ Equipment

- EPV16
- Spirit level
- Rope
- Pulley
- Test weights & harness
- Ratchet tie down

❑ Setup and Procedure

The rated load (200kg) is to be placed inside the basket 100mm from the inside face. The manual force in 400N with an additional multiplication factor of 1.1 giving 440N or 44.8kg. The line of action of this force is such that it produces the greatest overturning moment. That is the line of action of the force is perpendicular to a line joining the top rail of the platform to the tipping line (see Figures 1 and 2).

The wind load is assumed to act at the centre of area of the elevated components. The wind load for when the booms are over the cab is 978N at 4.57m above ground. The wind load for when the booms are over the side is 947N at 4.67m above ground. the overturning moment from the wind is used to find an equivalent force along the line of action of the manual force.

❑ The test procedure is as follows

❑ Front stability

1. Set a pulley with rope, 7m above the ground on a fixed pole.
2. Place the machine so that the cab is pointing towards the fixed pole. The centre of the slew bearing must be 9.5m from a point directly beneath the pulley.
3. Raise the machine on the stabilisers to minimum height to activate the interlocks.
4. Level the machine laterally using the spirit level.
5. Level the machine fore and aft such that it is 0.5 degrees cab down from level. (This simulates a poor setup by the end user).
6. Slew the booms until the rear of the basket is pointing towards the pole.
7. Tie the rope from the pulley over the top rail of the platform on the basket centre line to the lanyard attachment points.
8. Load the platform with the rated load 1 00m from the inside face.
9. Chain the machine to the ground with the chains slightly slack.
10. Raise the booms to maximum outreach (lower boom fully up and top boom and jib boom horizontal).
11. Attach a ratchet tie down to the rope coming from the pulley. Attach the other end to the load simulating the wind and manual force (92.3kg).
12. Raise the load simulating the wind and manual force with the ratchet tie down until the load is between 100 and 200mm above the ground. Ensure that the loads are not swinging i.e. the loads are static. (If both ‘rear’ legs lift clear of the ground STOP the test and release the ratchet).

❑ Side stability

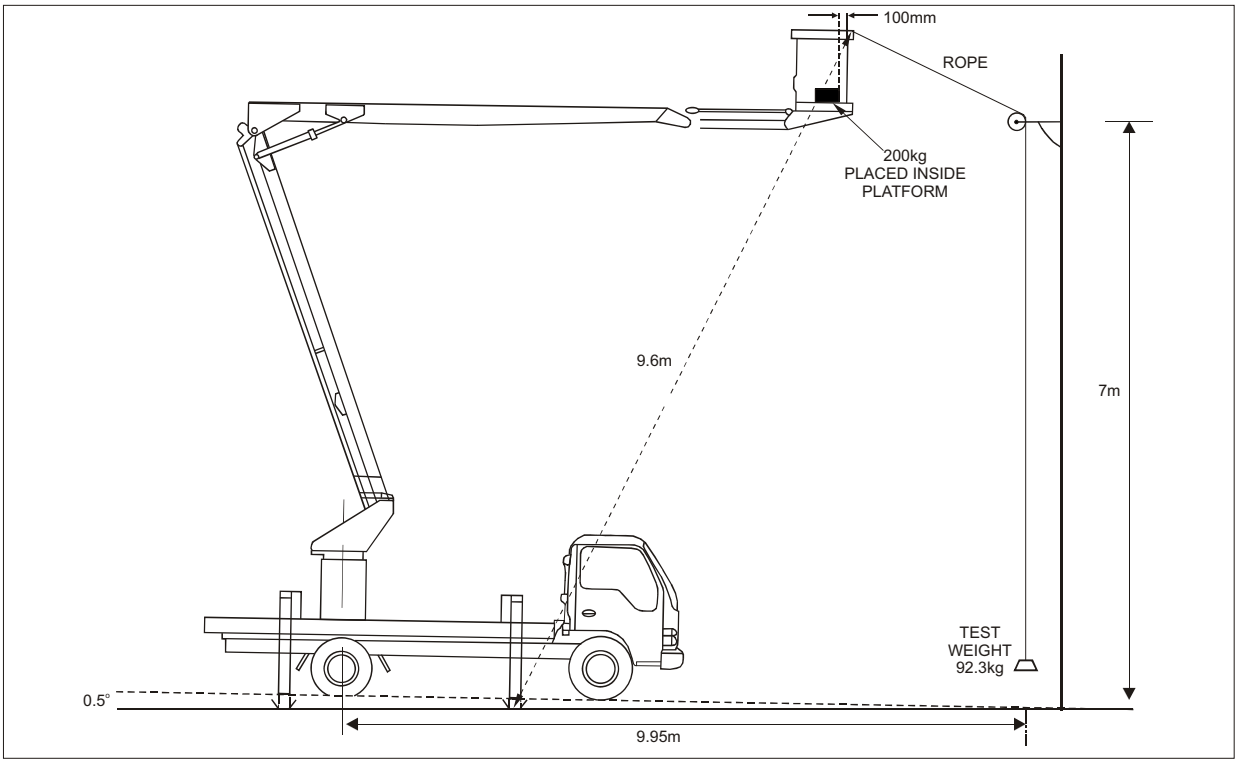
1. Set a pulley with rope, 7m above ground on a fixed pole.
2. Place the machine so that the machine side is facing towards the fixed pole. The centre of the slew bearing must be 9m from a point directly beneath the pulley.
3. Raise the machine on the stabilisers to minimum height to activate the interlocks.
4. Level the machine fore and aft using the spirit level.

5. Level the machine laterally such that the side closest to the pole is 0.5 degrees down from level. (This simulates a poor setup by the end user.
6. Slew the booms until the rear of the basket is pointing towards the pole.
7. Tie the rope from the pulley over the top rail of the platform on the basket centre line to the lanyard attachment points.
8. Load the platform with the rated Toad 1 00m from the inside face.
9. Chain the machine to the ground with the chains slightly slack.
10. Raise the booms to maximum outreach (lower boom fully up and top boom and jib boom horizontal).
11. Attach a ratchet tie down to the rope coming from the pulley. Attach the other end to the load simulating the wind and manual force (89kg).
12. Raise the load simulating the wind and manual force with the ratchet tie down until the load is between 100 and 200 above the ground. Ensure that the loads are not swinging i.e. the loads are static. (If both legs on the side away from the pole lift clear of the ground STOP the test and release the ratchet).

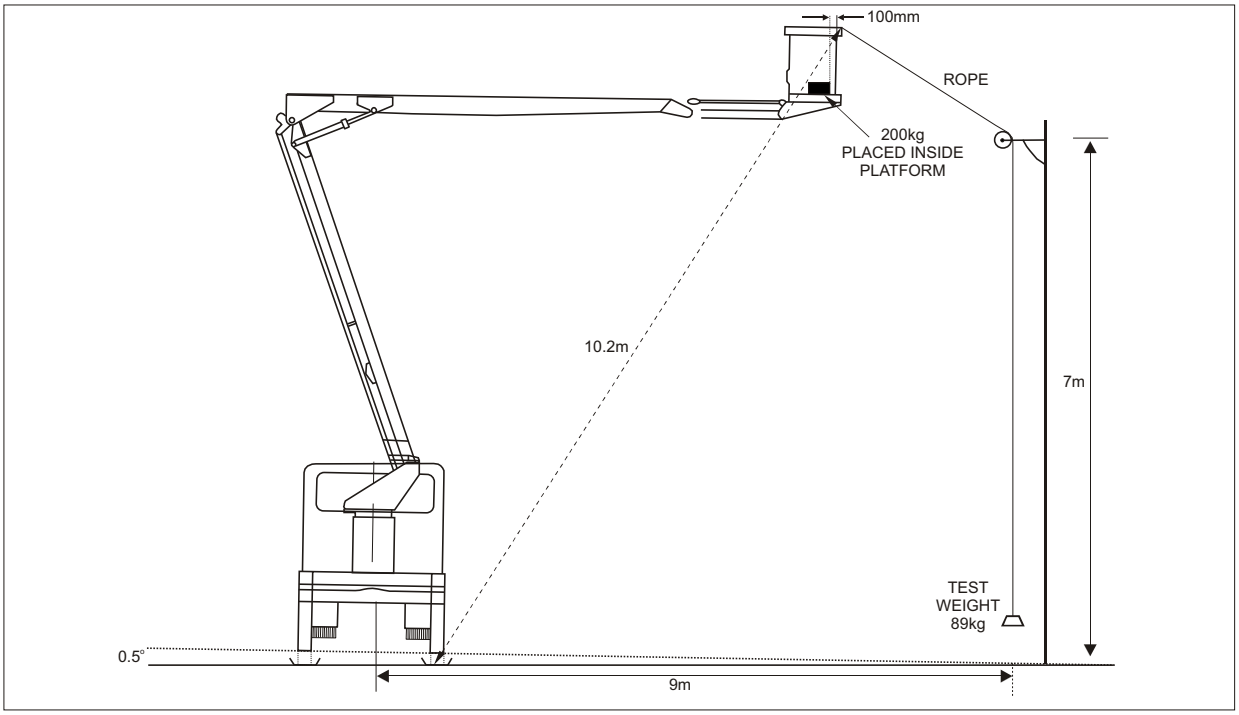
❑ Pass criteria

The machine can be assessed as meeting the requirements of AS 1418-10 2004 Appendix G Stability Calculations if the load simulating the wind and manual force can be raised clear of the ground while maintaining at least 3 point contact i.e. not more than 1 stabiliser foot off the ground.

❑ Figure 1 Front Stability Test



❑ Figure 2 Side Stability Test



■ Low-voltage Insulating Covering Test

❑ Purpose

The low-voltage insulating covering test is used to prove the integrity of boom insulating covering. Test method

❑ The procedure shall be as follows:

(a) Bridge all metalwork of the various parts of the booms and basket and connect to earth.

(b) Apply a temporary electrode in close contact with surfaces of covering or guards fitted to the booms.

(c) Apply a 1 min dry withstand test voltage, of 5kv ac RMS, to the temporary electrode.

❑ Pass criteria

There shall be no puncture or disruptive discharge.

Note:

This test may be carried out in multiple sections if the test current due to capacitive leakage on the complete temporary electrode is likely to exceed the maximum current available from the test set.

■ Basket Vertical Withstand Test

❑ Purpose

The basket vertical withstand test is used to verify that the insulation rating of the basket, complete with all fittings and attachments installed, is adequate to minimize the risk of short-circuit or transfer of potential in the vertical plane.

❑ Test set-up

The test shall be set up as illustrated in figure 1 below

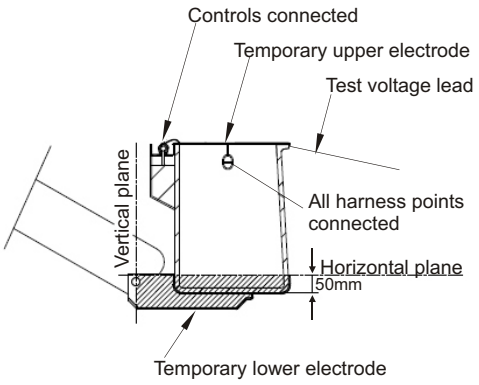


Figure 1

❑ Test Method

The procedure shall be as follows:

(a) Install a temporary upper (plate or foil) electrode in contact with the entire top horizontal lip of the basket.

(b) Bond the operator's controls, harness attachment points and power tool outlets, plus any exposed conductive components near the top of the basket, to the temporary upper electrode. (c)

(c) Install a temporary lower (foil) electrode in contact with the external surface of the base of the basket. Shape the electrode into all contours of the external surface of the basket bottom and covers using the simulated conductor as described in A51418.10 The electrode shall cover the surface lying below a horizontal plane located 50 mm above the level of the internal floor and extend to a vertical plane intersecting the boom pivot pin as shown in figure 1.

(d) Position the basket to best simulate the most onerous likely working position when elevated to greater than 7.5 m.

(e) Apply a 1 min dry power frequency withstand test voltage of 5kv ac RMS to the upper electrode with the lower electrode connected to earth.

Note:

This test may be carried out in multiple sections if required (the test current due to capacitive leakage on the complete temporary electrodes may exceed the maximum current available from the test set).

❑ Pass criteria

There shall be no puncture or disruptive discharge during the application of the test voltage.

■ Basket puncture test

❑ Purpose

The basket puncture test is used to verify that the insulation rating of the basket, complete with all fittings and attachments, is adequate to minimize the risk of short-circuit or transfer of potential through the basket wall.

❑ Test set-up

The test shall be set up as illustrated in figure 2, below.

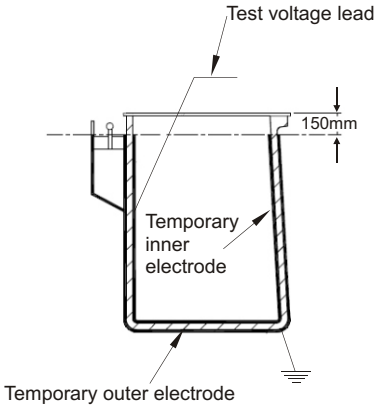


Figure 2.

❑ Test Method

Testing procedure shall be as follows:

(a) Install a temporary foil in contact with the exterior surface of the basket, including the base. Shape the electrode into all contours using the simulated conductor described in AS1418.10

(b) Install a temporary inner electrode in close contact with the inner surface of the basket. Shape the electrode to all contours of the inner surface. The inner electrode may be foil or tap water or a combination of both.

(c) Extend the electrodes vertically to a position 150 mm from the top horizontal lip of the basket.

(d) Apply a 1 min dry power frequency withstand test voltage of 5kv ac RMS to the inner electrode with the outer electrode connected to earth.

❑ Pass criteria

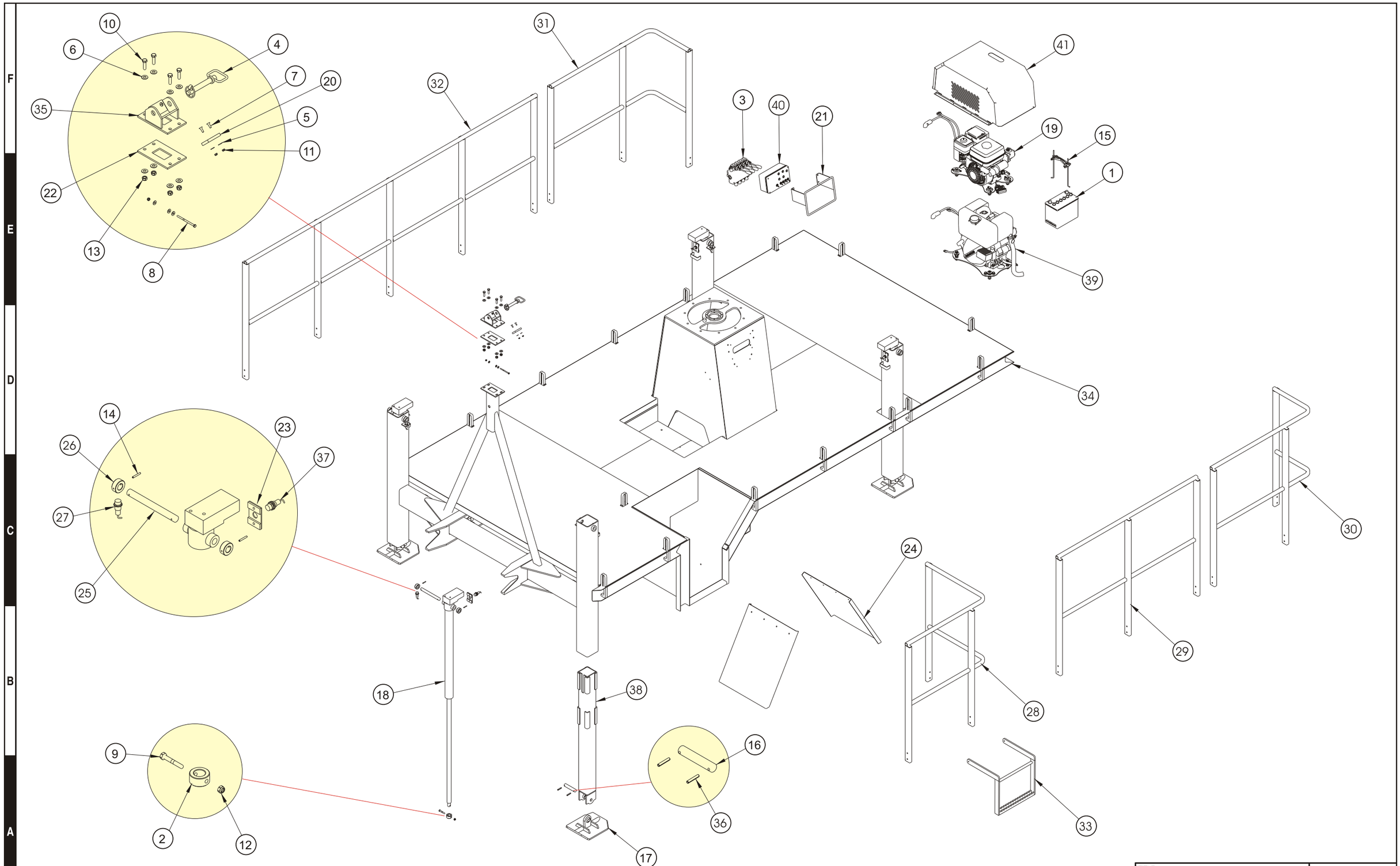
There shall be no puncture or disruptive discharge during the application of the test voltage.

Note:

Where any metalwork causes excessive audible discharges, the test should be repeated with the metalwork connected to the nearest electrode.

Subframe assembly

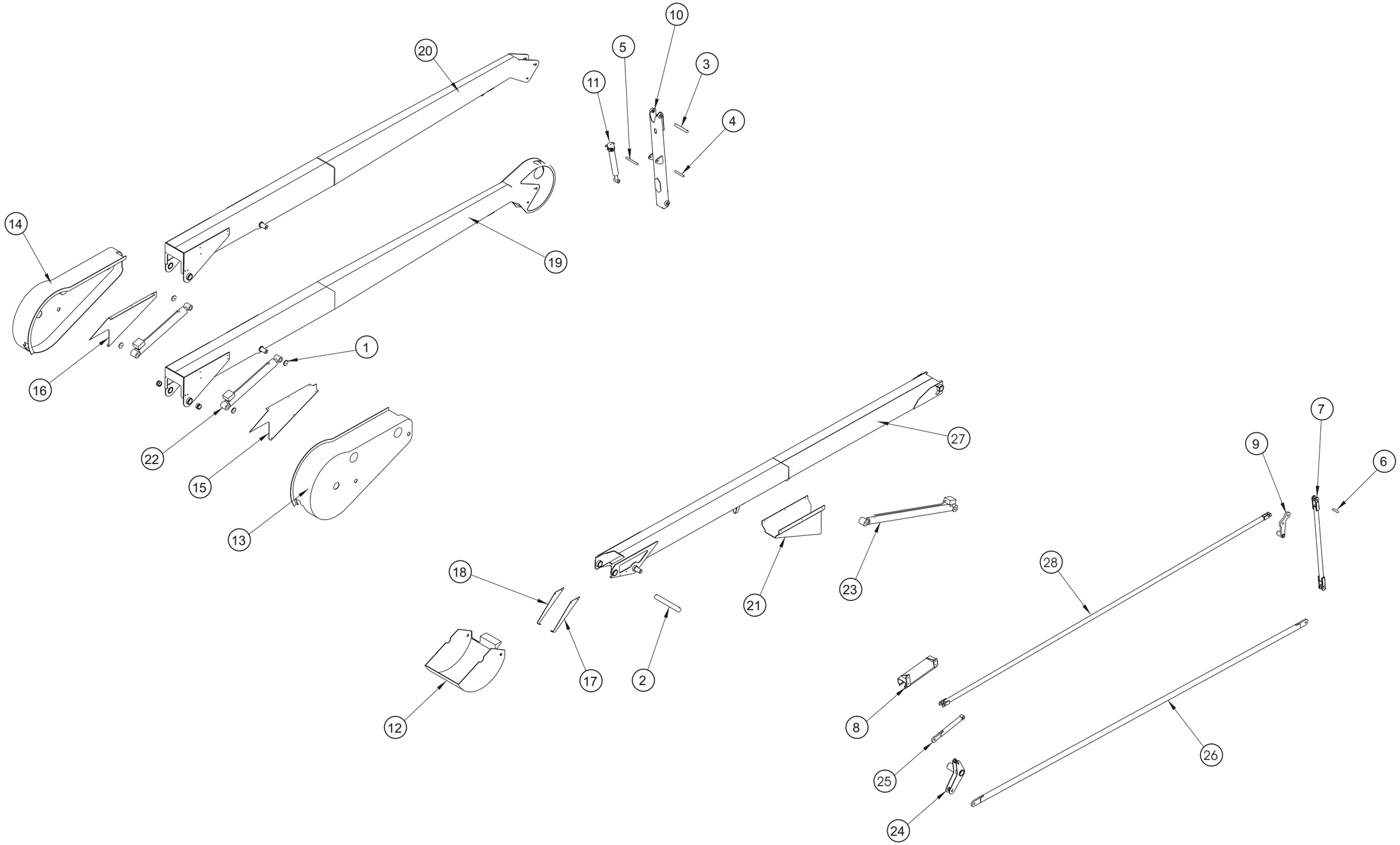
Item	Part No	Qty	Description
1.	1288	1	Battery
2.	1594-006	4	Pin, locking boss
3.	1651	1	Casappa valve
4.	1771	1	Pin
5.	3603-06	7	Washer, plain
6.	3603-10	8	Washer, plain
7.	3606-06020	4	Screw, socket head, countersunk
8.	3610-06090	1	Bolt
9.	3610-08050	4	Bolt
10.	3610-10035	4	Bolt
11.	3611-06	5	Nut, nyloc
12.	3611-08	4	Nut, nyloc
13.	3611-10	4	Nut, nyloc
14.	3633-7	8	Roll pin
15.	10268-2	1	Battery bracket
16.	10853	4	Pin, 20mm x 196
17.	10854	4	Swivel foot
18.	11791	4	Cylinder assembly, vertical stabiliser (710mm stroke)
19.	12413	1	Engine assembly
20.	12419-4	2	Boom rest wear pad
21.	13031	1	Control guard, Upper Fibreglass basket
22.	13054-3	1	Boom rest base, EPV
23.	13571-10	4	Proximity mount weld
24.	13571-13	4	Mudguard foldment
25.	13571-4	4	Pin, 20mm x 196
26.	13571-5	8	Pin, locking boss
27.	13572	4	Inductive proximity, normally closed
28.	13655-01	1	Handrail, LF, EPV HD
29.	13655-02	1	Handrail, LM, EPV HD
30.	13655-03	1	Handrail, LR, EPV HD
31.	13655-04	1	Handrail, RR, EPV HD
32.	13655-05	1	Handrail, RF, EPV HD
33.	13657	1	Step, fold down, subframe EPV
34.	13661	1	Layout, subframe, EPV HD
35.	13662	1	Boom rest, EPV HD, non LV
36.	60000-036	8	Roll pin
37.	505072-000	4	Inductive proximity, normally open
38.	10863	4	B inner leg stabiliser, intermediate
39.	12449A	1	Diesel engine assembly
40.	13547A	1	Auto stabiliser option
41.	13643A	1	Engine cover



TITLE Subframe Assembly

Snorkel model EPV16

snorkel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Item	Part No	Qty	Description
1.	1578-015	4	Cap, retaining cfylinders
2.	1578-021	1	Upper to lower boom knuckle pin
3.	9790	1	Basket frame pin
4.	9793	1	Pin, 3/4" x 139mm
5.	9794	`1	Pin, 19.05mm x 182
6.	9859	2	Pin, 20 x 81mm
7.	9877	1	Extension level rod weld
8.	9880	1	Levelling channel weldment
9.	9884	1	Level quadrant
10.	9885	1	Flyboom
11.	11555	1	Flyboom cylinder
12.	12896-1	1	Lower clamshell cover
13.	12896-2	1	Upper clamshell cover, Left hand
14.	12896-3	1	Upper clamshell cover, Right hand
15.	12896-4	1	Infill, Left hand
16.	12896-5	1	Infill, Right hand
17.	12896-7	1	Support, lower clamshell, Left hand
18.	12896-8	1	Support, lower clamshell, Right hand
19.	12899	1	Upper boom, LV
20.	13016	1	Upper boom, MHP HD
21.	13723	1	Cylinder cover, LV
22.	1589	2	Upper boom, cylinder assembly
23.	9928	1	Lower boom, cylinder assembly
24.	9951	1	Quadrant arm assembly
25.	9879	1	Upper short level rod
26.	13058-1	1	Lower level rod
27.	13672	1	Boom, lower, MHP HD, and EPV HD
28.	9878	1	Upper level rod, long

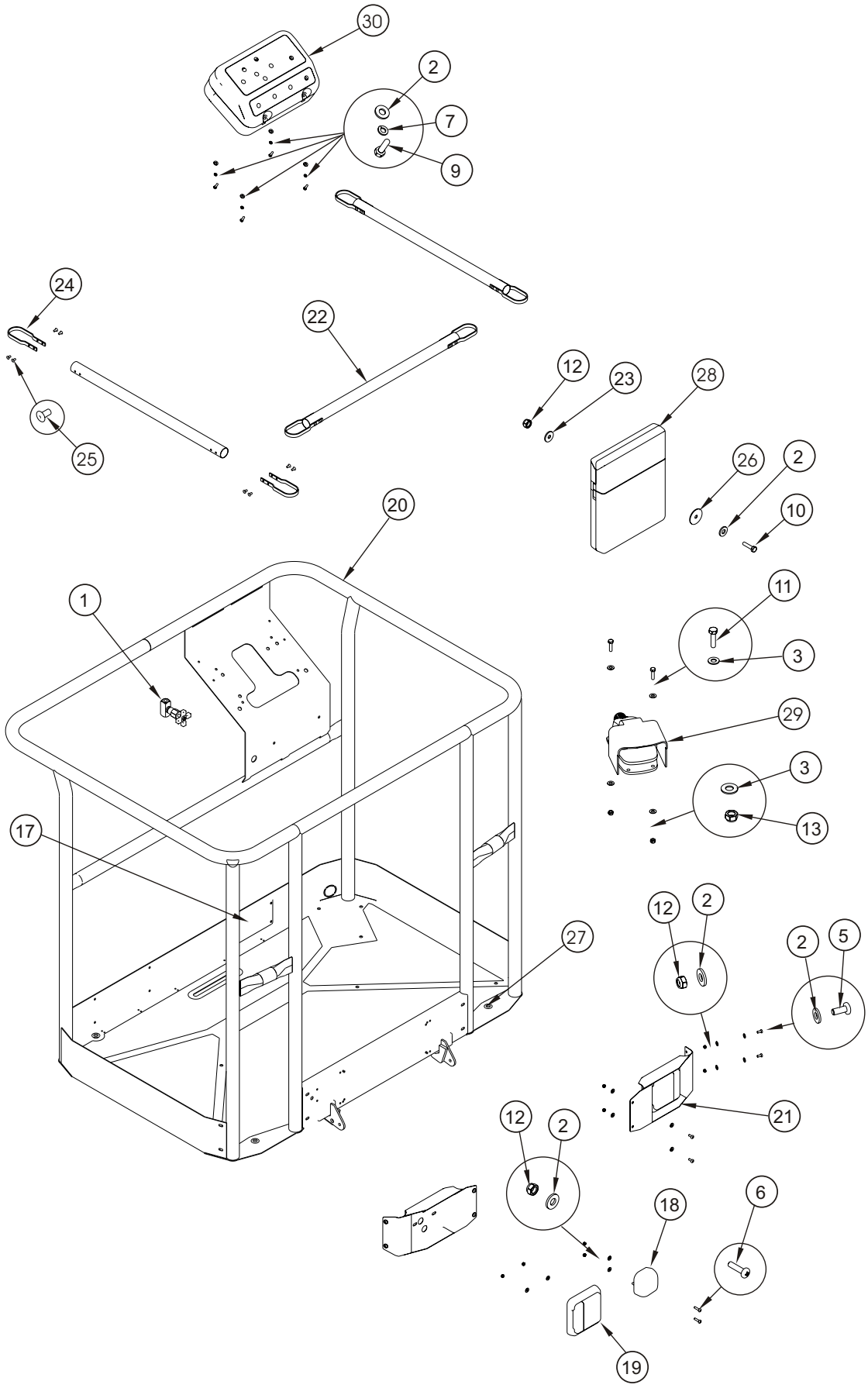
Notes:

Item 19 replaces item 20 for Low Voltage option

Items 12, 13, 14, 15, 16, 17, 18, and 21 are only used for Low Voltage Option

Platform assembly

Item	Part No	Qty	Description
			Basket assembly
1.	3027	1	Flow control valve
2.	3603-05	28	Washer, plain
3.	3603-08	4	Washer, plain
4.	3603-16	2	Washer, plain
5.	3604-05012	8	Screw, Pan head, M5 x 12
6.	3604-05020	2	Screw, machine
7.	3605-05	4	Washer, spring
8.	3608-16C	2	Cone lok nut, M16
9.	3610-05016	4	Bolt, metric
10.	3610-05020	2	Bolt, metric
11.	3610-08030	2	Bolt, metric
12.	3611-05	16	Nut, metric, nyloc
13.	3611-08	2	Nut, metric, nyloc
14.	3617-16035	8	Bolt, metric
15.	3626-10	4	Permaglide bush, flanged
16.	3631-16	8	Washer, disc lock
17.	9727	1	Certificate holder
18.	12386-2	1	Licence plate lamp, LED
19.	13056-4	2	Trailer light, combination
20.	13484	1	Basket weld
21.	13484-18	2	Recessed light guard
22.	13484-22	3	Drop bar, 610mm long
23.	13525-05	2	Washer, fender
24.	058523-000	6	U bracket
25.	60027-066N	24	Rivet, 1/8" x 5/32"
26.	60030-198	2	Washer, fender, 1/4"
27.	65004-008	4	Rubber grommet
28.	562386	1	Literature compartment
29.	3020021	1	Foot switch
30.	12385A	1	Upper control box assembly (electric controls)
32.	13524A	1	Control box assembly, upper, MHP HD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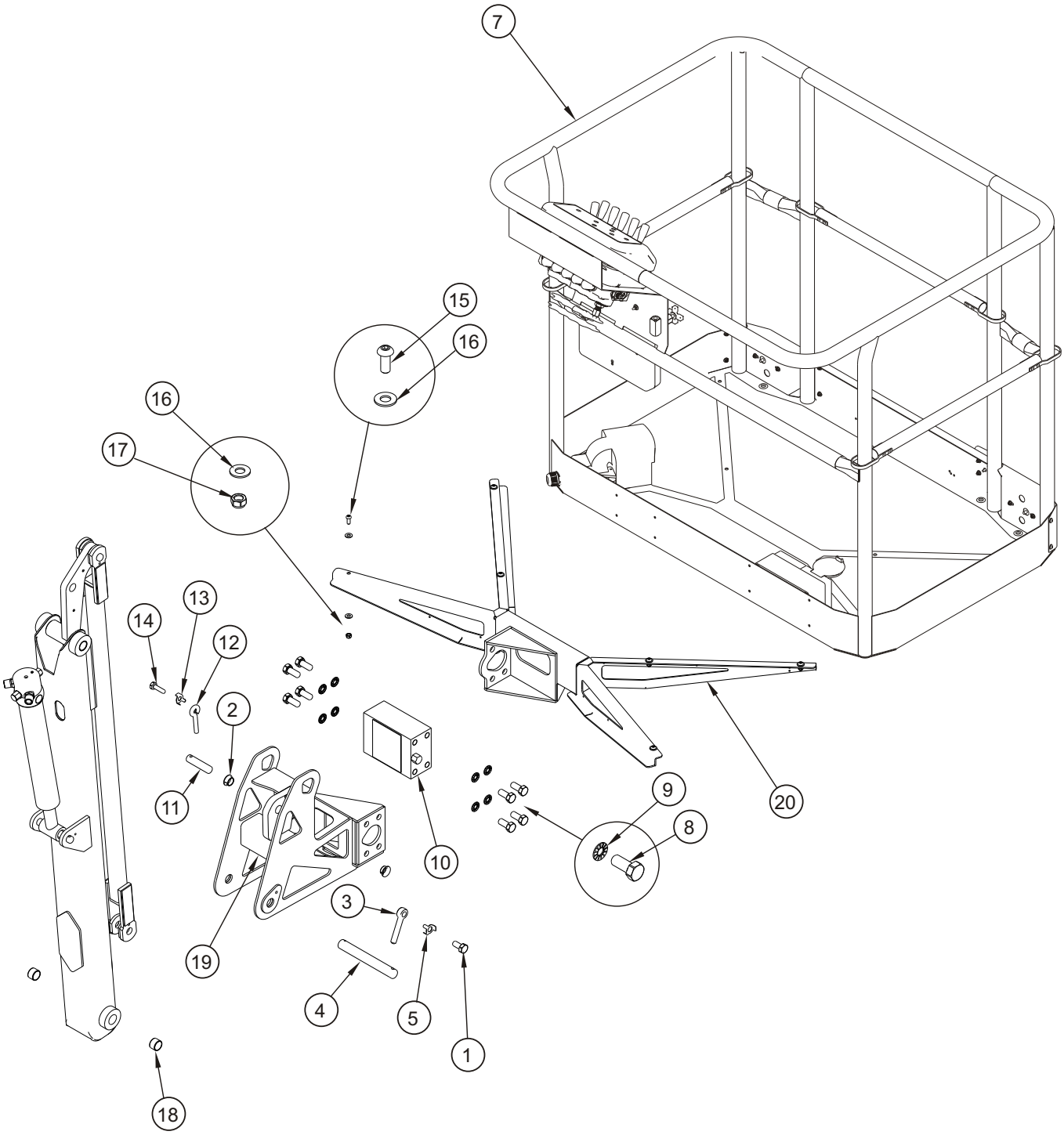
Basket mount assembly

Item	Part No.	Qty	Description
1.	3610-10020	1	Bolt, metric
2.	3626-13	2	Permaglide bush, flanged
3.	8626	2	Pin keeper
4.	9790	1	Pin
5.	11492-3	1	Washer, tab
7.	13484A	1	Basket assembly
8.	3617-16035	8	Bolt, metric
9.	3631-16	8	Washer, nord-lock
10.	13468	1	Load cell
11.	9859	1	Pin
12.	8628	1	Pin keeper
13.	11492-1	1	Washer, lock, M6
14.	3610-06020	1	Bolt, M6 x 20
15.	3668-08020	6	Socket button head
16.	3603-08	12	Washer, plain
17.	3611-08	6	Nut, nyloc
18.	3624-3	2	Bush, 1" x 19.1"
19.	13498	1	Basket Quadrant, HD
20.	13497	1	Basket bottom mount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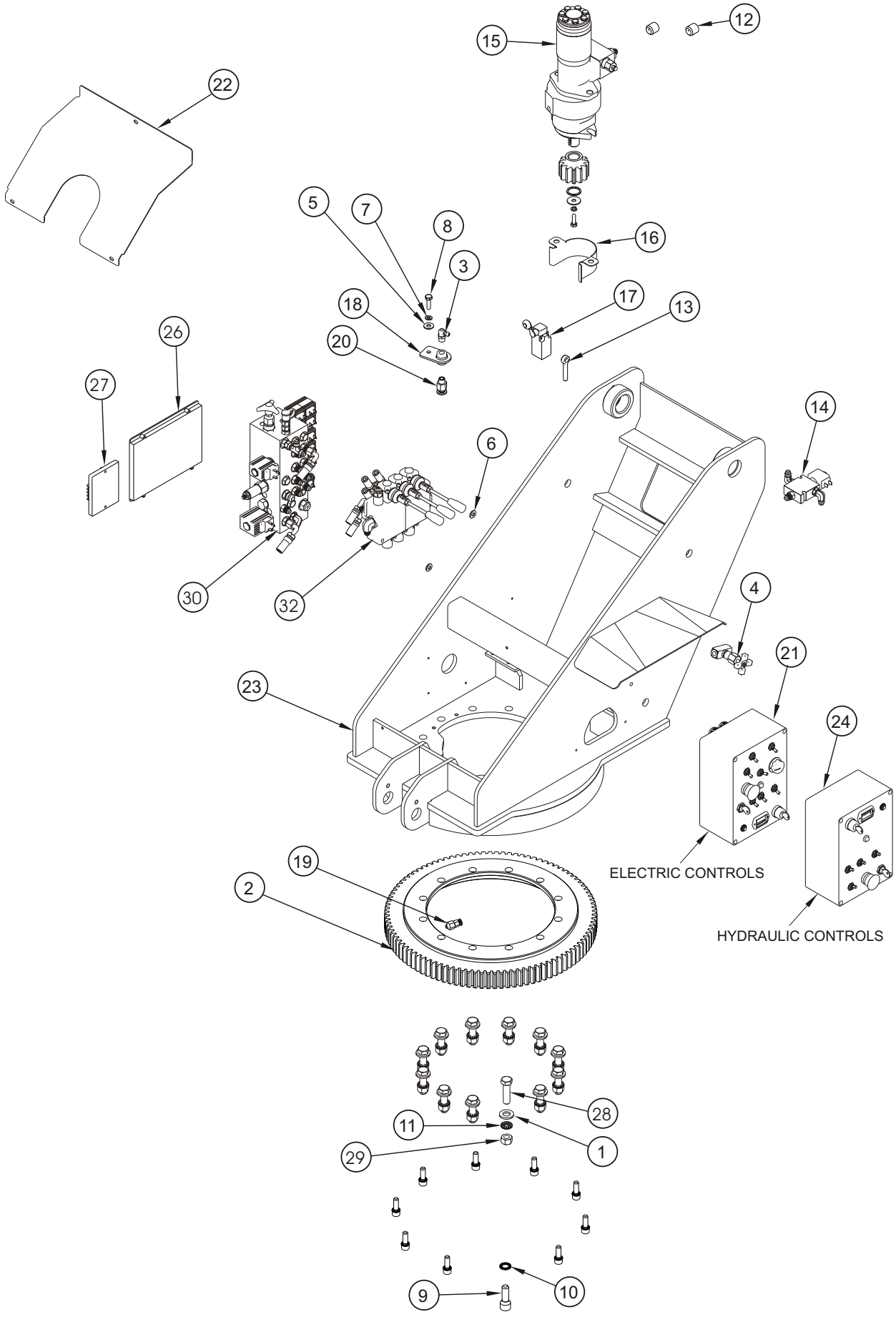
Column assembly

Item	Part No	Qty	Description
1.	1034-120	12	Washer, M16, Galvanised and hardened
2.	1067	1	Slew ring
3.	2030-003	1	Grease nipple
4.	3027	1	Flow control valve
5.	3603-06	1	Washer, plain
6.	3603-08	2	Washer, plain
7.	3605-06	1	Washer, spring
8.	3610-06020	1	Bolt, metric
9.	3613-12035	10	Cap screw, metric
10.	3631-12	10	Washer, disc lock
11.	3631-16	12	Washer, disc lock
12.	7804-001	2	Restrictor, 1.0 x 1/16" NPT
13.	8626	1	Pin keeper
14.	10549	1	Selector valve
15.	11943	1	Slew drive brake assembly
16.	12381-25	1	Pinion gear guard
17.	12445	1	Micro switch
18.	12483	1	Remote grease nipple weld
19.	12483-2	1	Adapter
20.	12483-3	2	Connector, tube
21.	12521	1	Control box assembly, (machines with electric controls)
22.	12679-60	1	Column cover
23.	12875	1	Column weld
24.	12877	1	Control box assembly, (machines with hydraulic controls)
26.	13485-01	1	Trionics, GP400C
27.	13485-03	1	Trionics, TBM
28.	600020-028N	12	Bolt, UNF hex
29.	60021-016	12	Nut, UNF
30.	11415B	1	Main control manifold (electric controls only)
32.	1559A	1	Lower control valve (hydraulic controls only)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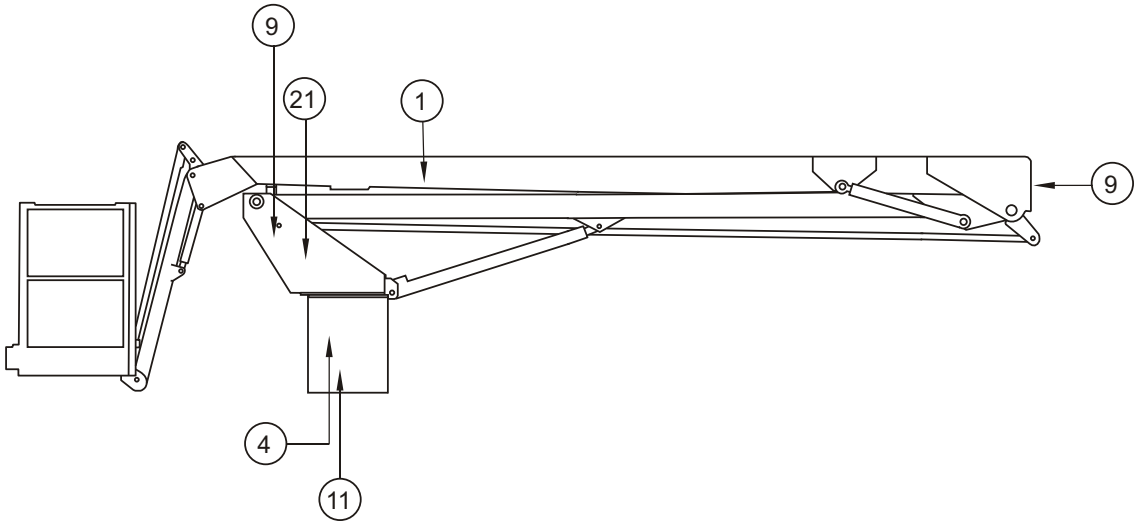
Placards and decals - electric controls

Item	Part No	Qty	Description
1.	511067-000	2	Decal, Snorkel web site
2.	0150448	1	Decal, lanyard attachment
3.	032-3899	1	Decal, Electrocution hazard
4.	12814	1	Decal, Hydraulic fluid
5.	12833-2	1	Serial number plate
6.	501453-000	2	Decal, Foot crush hazard
7.	1843	1	Decal, Warning, New Zealand only
	9428	1	Decal, Electric hazard, Australia only
8.	300699	1	Decal, Operators checklist
9.	45198-6	3	Decal, Do not disable limit switch
10.	45198-7	2	Decal, Wind speed rating
11.	569295	2	Decal, Snorkel 3 logo
18.	12545	1	Decal, Auto stabiliser operation
19.	10036	1	Decal, Cradle latch
20.	1772-002-K	1	Decal, Fit boom cradle lock pin
21.	12753	1	Decal, Emergency bleed down valve
22.	0072531	1	Decal, Electrocution hazard (prior to serial number NZ070806)
23.	0323897	1	Decal, Danger must not operate
24.	12423-200	1	Decal, Rated load
25.	99228-1	1	Decal, Caution safety harness
27.	56242-6	1	Decal, Operator manual enclosed
28.	13030	1	Decal, Electrocution hazard (after serial number NZ070806)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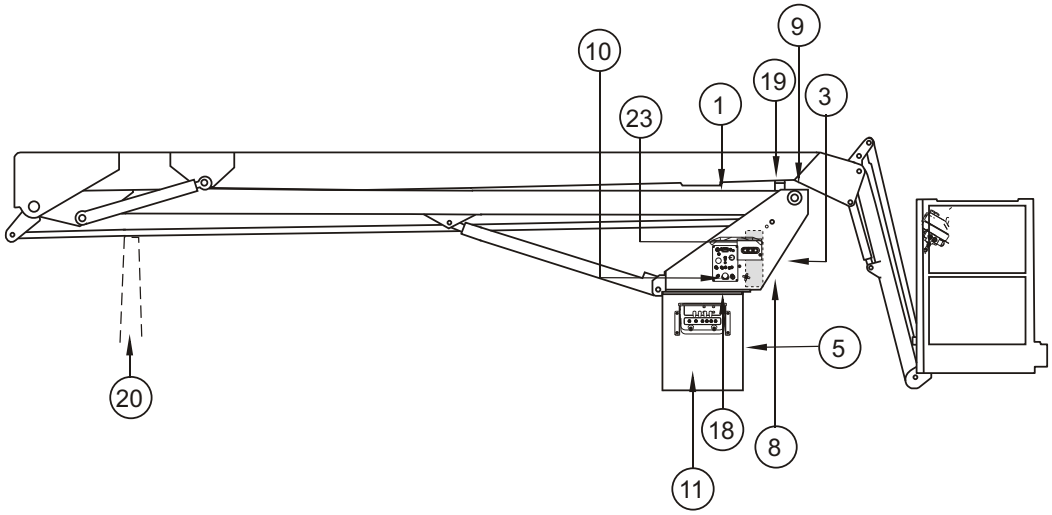
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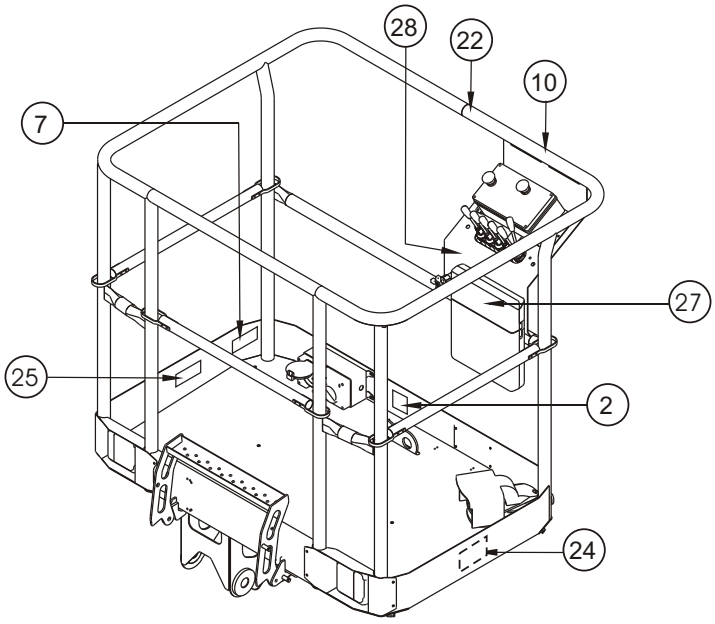
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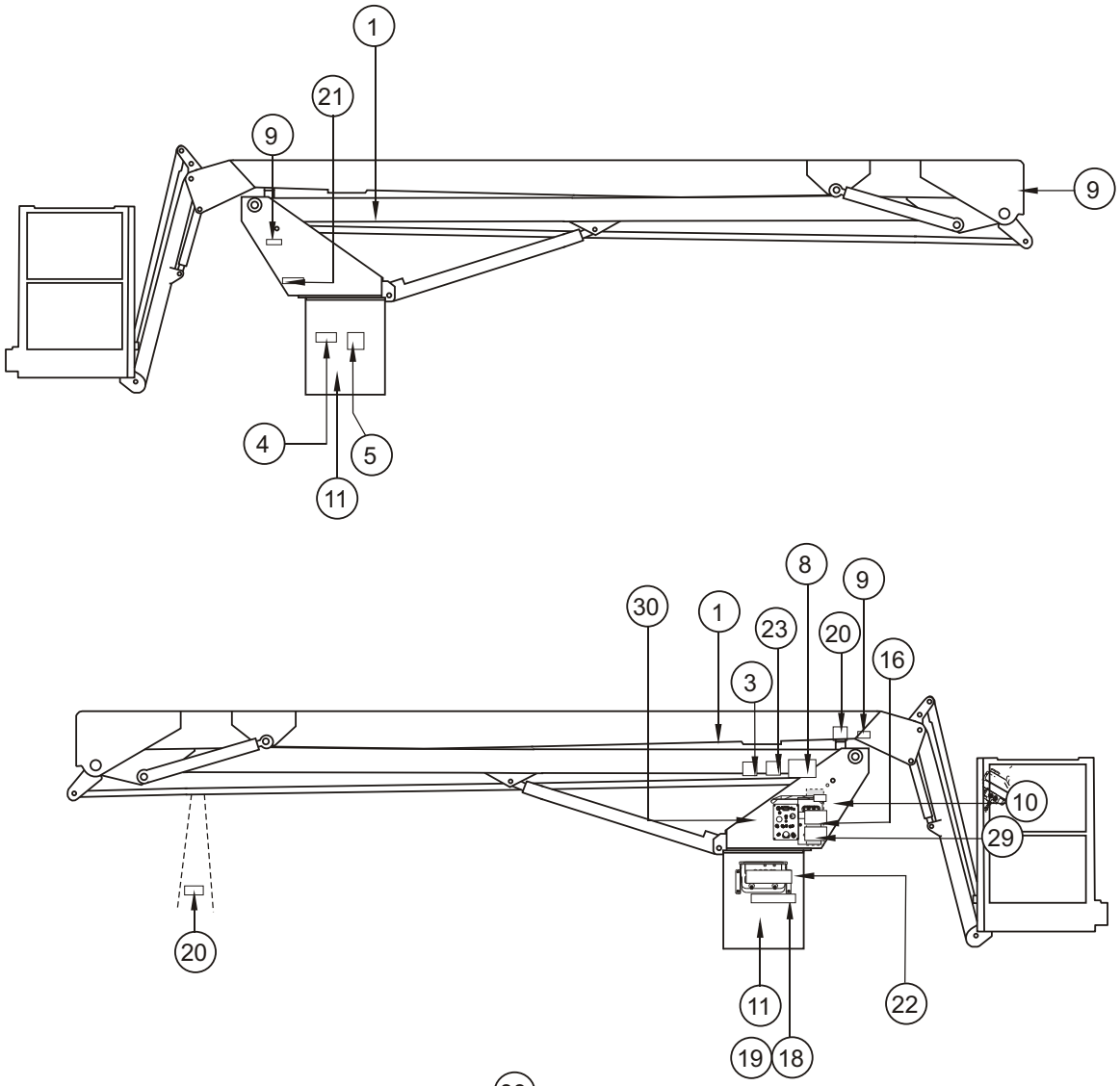
Placards and decals - hydraulic controls

Item	Part No	Qty	Description
1.	511067-000	2	Decal, Snorkel website
2.	0150448	1	Decal, lanyard attachment
3.	032-3899	1	Decal, Electrocution hazard
4.	12814	1	Decal, Hydraulic fluid
5.	12833-2	1	Serial number plate
7.	1843	1	Decal, Warning, New Zealand only
	9428	1	Decal, Electric hazard, Australia only
8.	300699	1	Decal, Operators checklist
9.	45198-6	3	Decal, Do not disable limit switch
10.	45198-7	2	Decal, Wind speed rating
11.	569295	2	Decal, Snorkel 3 logo
16.	13052-1	1	Decal, Lower control valve operation
18.	12545	1	Decal, Auto stabiliser operation (when fitted)
19.	013-0025	1	Decal, Warning with stabilisers
20.	1772-002-K	2	Decal, Fit boom cradle lock pin
21.	12753	1	Decal, Emergency bleed down valve
22.	13052-5	1	Decal, Manual stabilisers
23.	0323897	1	Decal, Danger must not operate
24.	12423-200	1	Decal, Rated load
25.	99228-1	1	Decal, Caution safety harness
26.	9213	1	Decal, Gasoline
27.	56242-6	1	Decal, Operator manual enclosed
28.	13030	1	Decal, Electrocution hazard
29.	13052-4	1	Decal, In case of function failure
30.	12877-1	1	Decal, Lower control box
31.	0070420	1	Decal, Emergency bleed down
32.	12861-1	1	Decal, Upper control box, non-rotate
	12861-2	1	Decal, Upper control box, rotate
33.	13029	1	Decal, Emergency lowering
35.	13205	1	Decal, 10.9m height restriction, Australia only (from serial number NZ080821)
38.	501453-000	4	Decal, Foot crush hazard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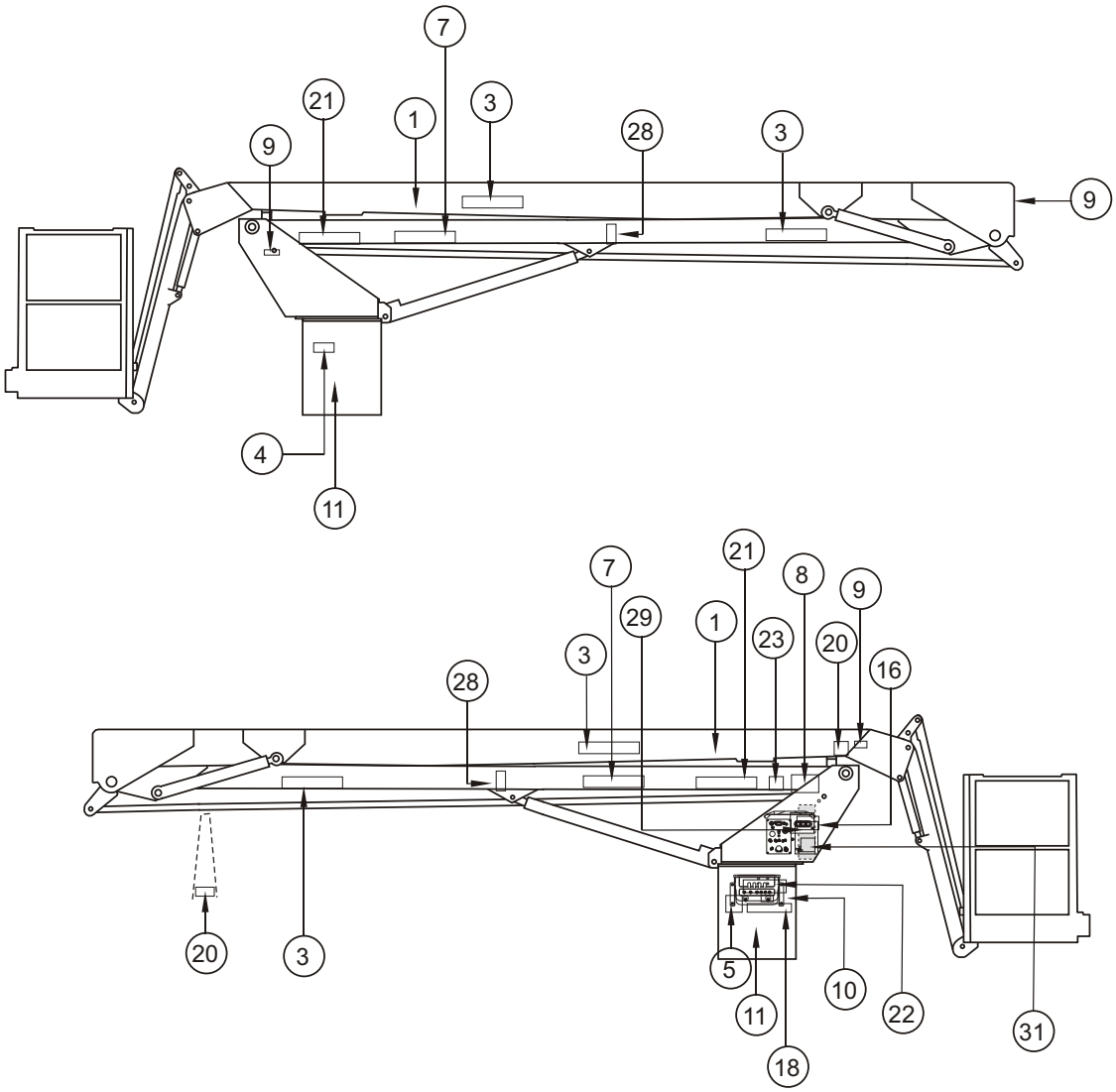
Placards and decals - LV insulated machines

Item	Part No	Qty	Description
1.	511067-000	2	Decal, Snorkel website
2.	0150448	1	Decal, lanyard attachment
3.	2829-1	6	Decal, LV cover
4.	12814	1	Decal, Hydraulic fluid
5.	12833-2	1	Serial number plate
7.	12829	2	Decal, Uninsulated
8.	300699	1	Decal, Operators checklist
9.	45198-6	3	Decal, Do not disable limit switch
10.	45198-7	2	Decal, Wind speed rating
11.	569295	2	Decal, Snorkel 3 logo
16.	9963	1	Decal, Lower control valve operation
18.	12545	1	Decal, Auto stabiliser operation (when fitted)
20.	1772-002-K	2	Decal, Fit boom cradle lock pin
21.	12829-2	2	Decal, Condition
22.	11843	1	Decal, Manual stabilisers
23.	0323897	1	Decal, Danger must not operate
24.	12423-200	1	Decal, Rated load
25.	99228-1	1	Decal, Caution safety harness
27.	56242-6	1	Decal, Operator manual enclosed
28.	12829-3		Decal, Warning stripe insulated/uninsulated (yellow/red)
29.	12877-1	1	Decal, Lower control box
30.	12861-1	1	Decal, Upper control box, non-rotate
	12861-2	1	Decal, Upper control box, rotate
31.	13029	1	Decal, Emergency lowering
33.	13205	1	Decal, 10.9m height restriction, Australia only (from serial number NZ080821)
36.	501453-000	4	Decal, Foot crush hazard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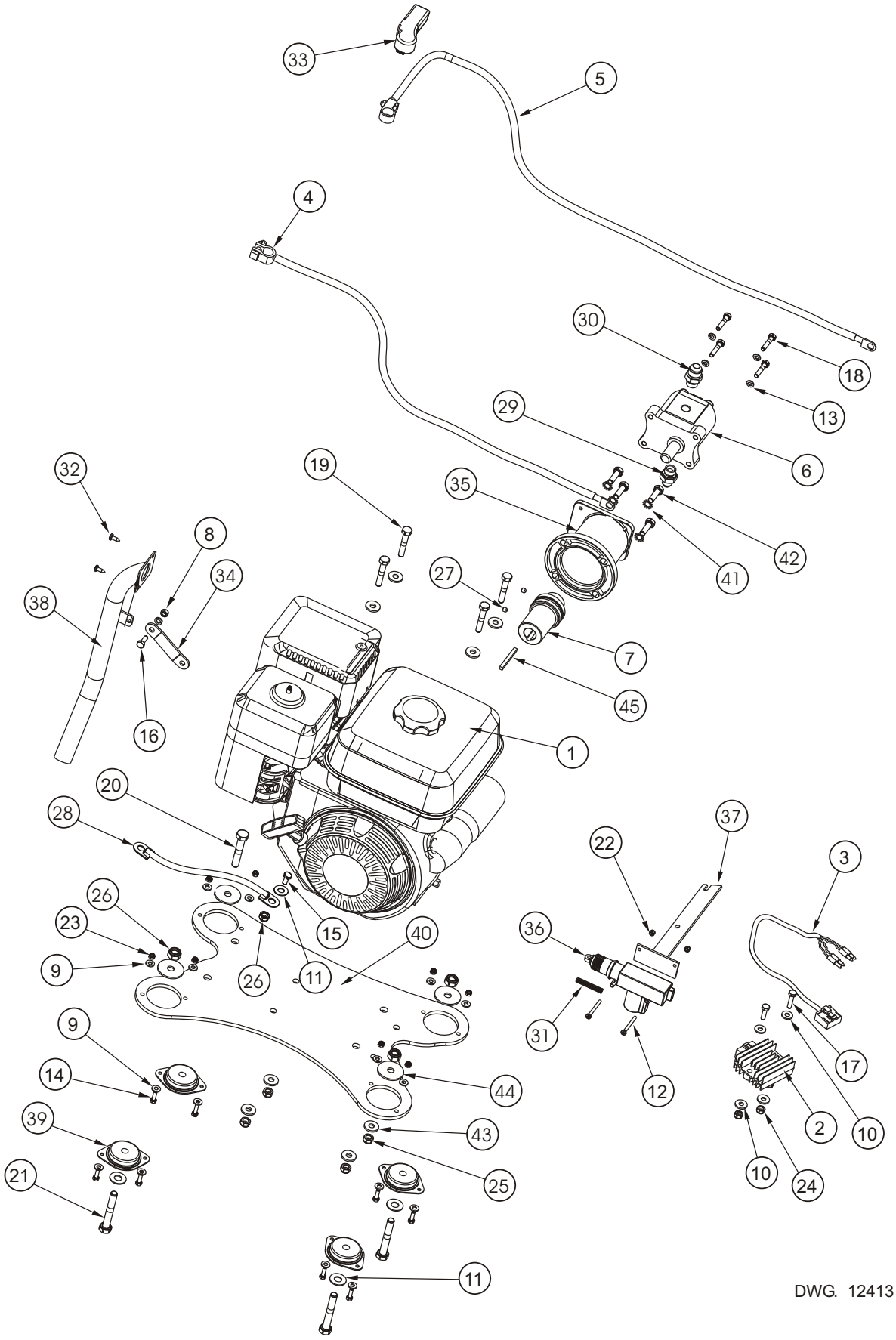
Engine assembly

Item	Part No	Qty	Description
	12413	1	Engine assembly
1.	1171-4	1	Honda GX160
2.	1171-4-022	1	Regulator / rectifier GX160
3.	1171-4-025	1	Loom, Honda rectifier
4.	1650-030	1	Battery cable
5.	1650-031	1	Battery cable
6.	1659	1	Gear pump
7.	1880	1	Drive coupling
8.	3602-06	1	Metric nut
9.	3603-05	16	Plain washer
10.	3603-06	4	Plain washer
11.	3603-10	4	Plain washer
12.	3604-04040	2	Metric screw pan head
13.	3605-06	5	Spring washer
14.	3610-05016	8	Metric bolt
15.	3610-10020	1	Metric bolt
16.	3610-06016	1	Metric bolt
17.	3610-06025	2	Metric bolt
18.	3610-06030	4	Metric bolt
19.	3610-08045	4	Metric bolt
20.	3610-10055	1	Metric bolt
21.	3610-10065	3	Metric bolt
22.	3611-04	2	Metric nylock nut
23.	3611-05	8	Metric nylock nut
24.	3611-06	2	Metric nylock nut
25.	3611-08	4	Metric nylock nut
26.	3611-10	4	Metric nylock nut
27.	3612-06006	2	Grub screw
28.	3649-10	1	Battery cable
29.	7013-003	1	BSPP (Dowty) x JICM nipple
30.	7013-004	1	BSPP (Dowty) x JICM nipple
31.	8398	1	Spring
32.	8978-1	2	Screw, self tapping
33.	10254	1	Cover, battery terminal
34.	10350-4	1	Exhaust bracket
35.	10417	1	Bell housing
36.	11444	1	Choke solenoid 12V
37.	11497	1	Choke solenoid bracket
38.	12407	1	Exhaust weldment
39.	12524	4	Engine mount
40.	12526	1	Engine mount plate
41.	60005-054	4	Lockwasher
42.	60016-090N	4	Bolt, plated
43.	60030-3N	8	Flat washer
44.	5560179	4	Flat washer, special
45.	1875KEY	1	Key steel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DWG. 12413

Section 2. - Hydraulics

SLEW MOTOR/BRAKE

SLEW

PAD

LOWER

RAISE

JIB CYL

LOWER CYL

UPPER CYL 1

0.6

UPPER CYL 2

0.6

OVER CENTRE VALVE

PROPORTIONAL FLOW CONTROL VALVE

HONDA

PUMP

STABILISER SELECTOR VALVE

S.S ORIFICE

2500 p.s.i.

RELIEF VALVE

FLOW CONTROL VALVE

11415 MAIN VALVE

CONTROL VALVE

BLEED DOWN VALVE

PILOT OPER. CHECK VALVE

ROTATOR OPTION

STABILISER PORT

TANK PORT

ACCUM

TANK PORT

EMERGENCY LOWER PORT

AUX. MOTOR

PUMP

AUX. MOTOR OPTION

2500 psi

PRESS SW

400 p.s.i.

LEG 1

LEG 2

LEG 3

LEG 4

LEG CYL

LEG VALVE BANK

RETURN FILTER 10 MICRON

F

E

D

C

B

A

1 2 3 4 5 6 7 8 9

TITLE Hydraulic schematic - standard
Machines with electric controls
Snorkel model EPV16

snorkel

SLEW MOTOR/BRAKE

SLEW

PAD

LOWER

RAISE

JIB CYL

LOWER CYL

UPPER CYL 1

0.6

UPPER CYL 2

0.6

OVER CENTRE VALVE

PROPORTIONAL FLOW CONTROL VALVE

HONDA

PUMP

S.S ORIFICE

2500 p.s.i.

RELIEF VALVE

FLOW CONTROL VALVE

CONTROL VALVE

11415 MAIN VALVE

BLEED DOWN VALVE

PILOT OPER. CHECK VALVE

STABILISER PORT

TANK PORT

ACCUM

TANK PORT

EMERGENCY LOWER PORT

ROTATOR OPTION

AUX. MOTOR

PUMP

AUX. MOTOR OPTION

P

T

PRESS SW

400 p.s.i.

LEG 1

LEG 2

LEG 3

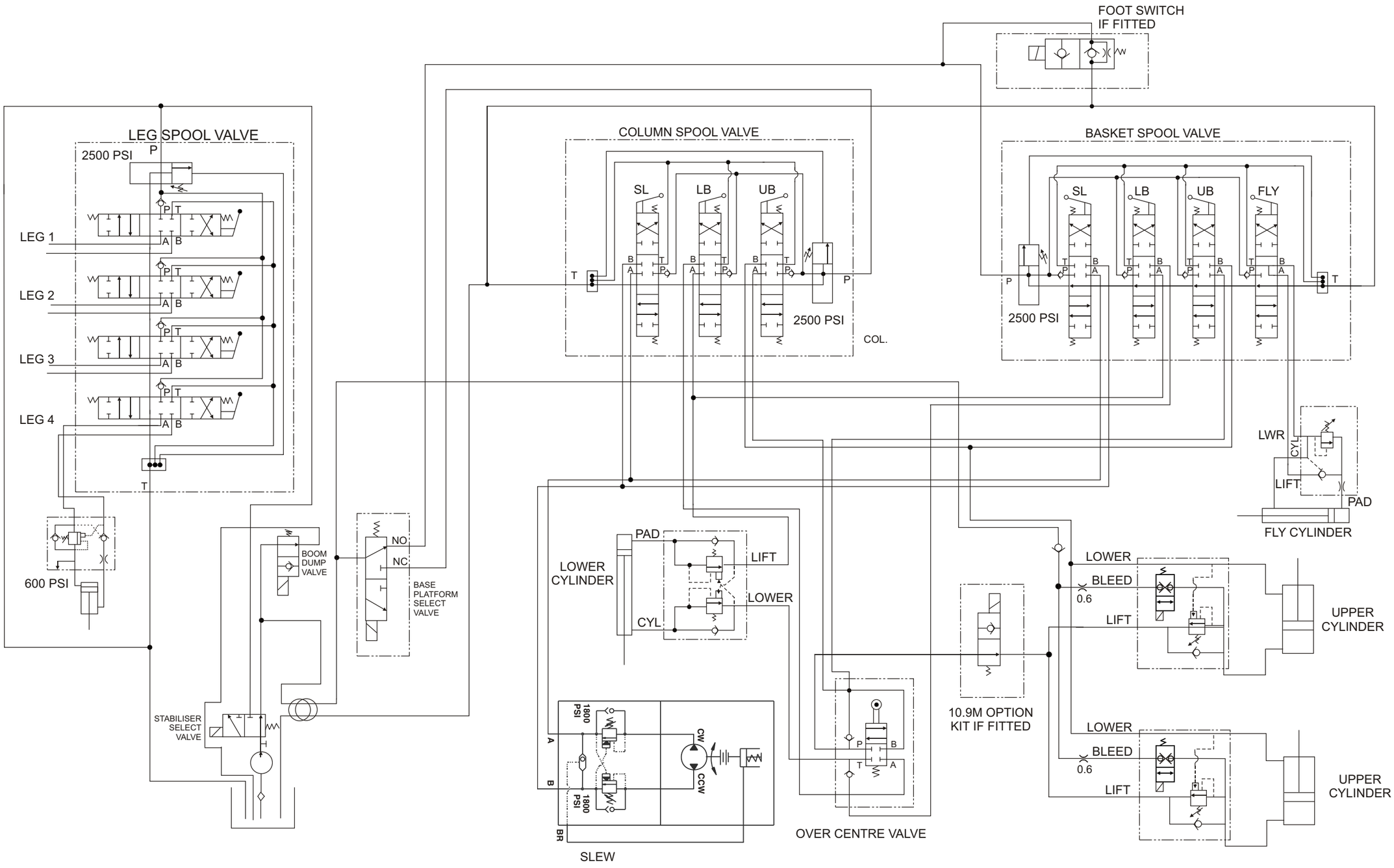
LEG 4

LEG CYL

LEG VALVE BANK

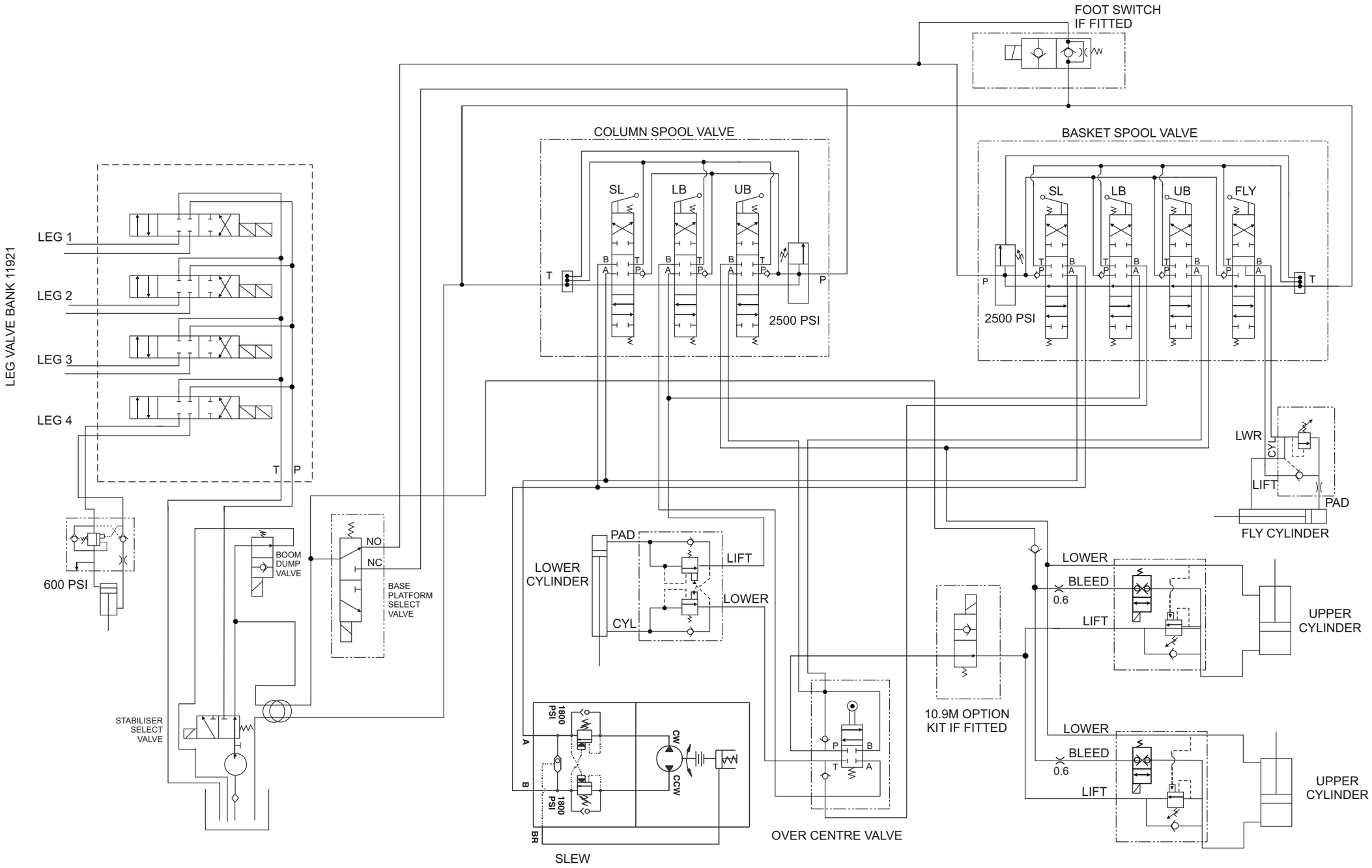
snorkel

TITLE Hydraulic schematic - auto level
Machines with electric controls
Snorkel model EPV16

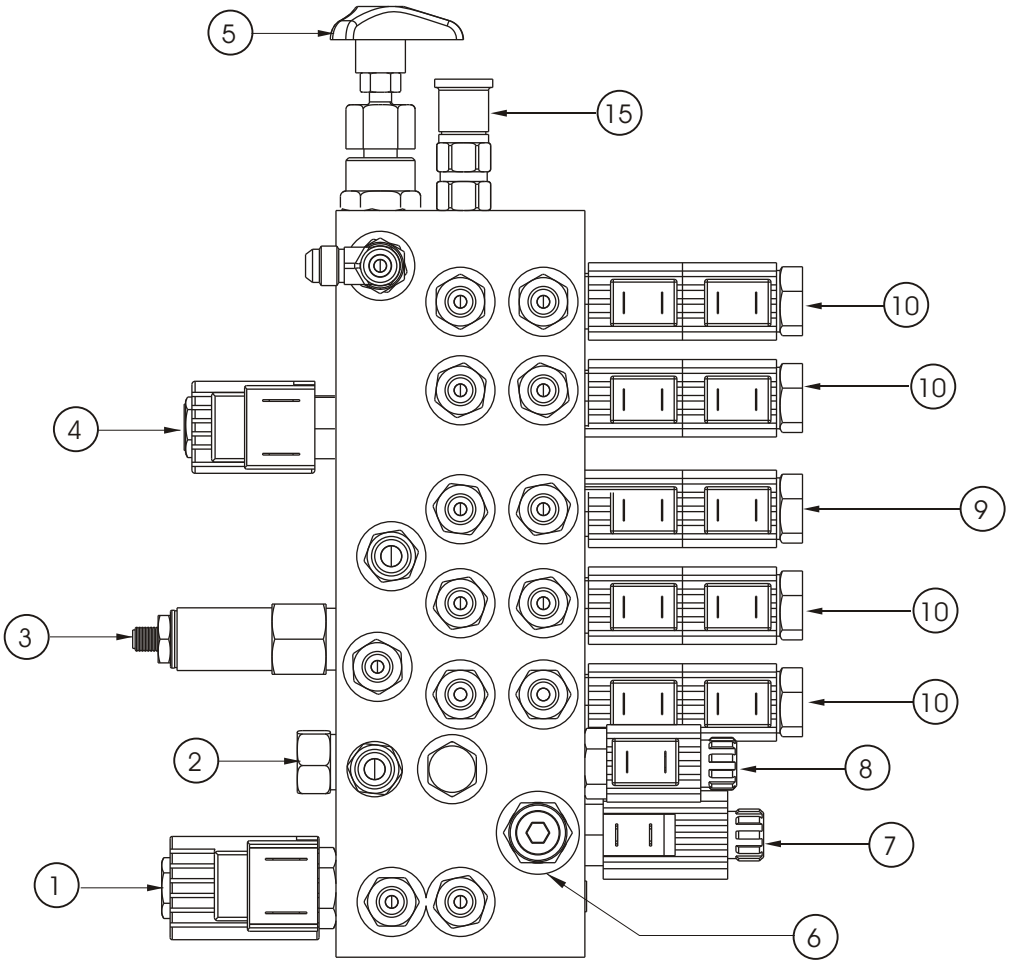


TITLE Hydraulic schematic - standard
Machines with hydraulic controls
Snorkel model EPV16

snorkel

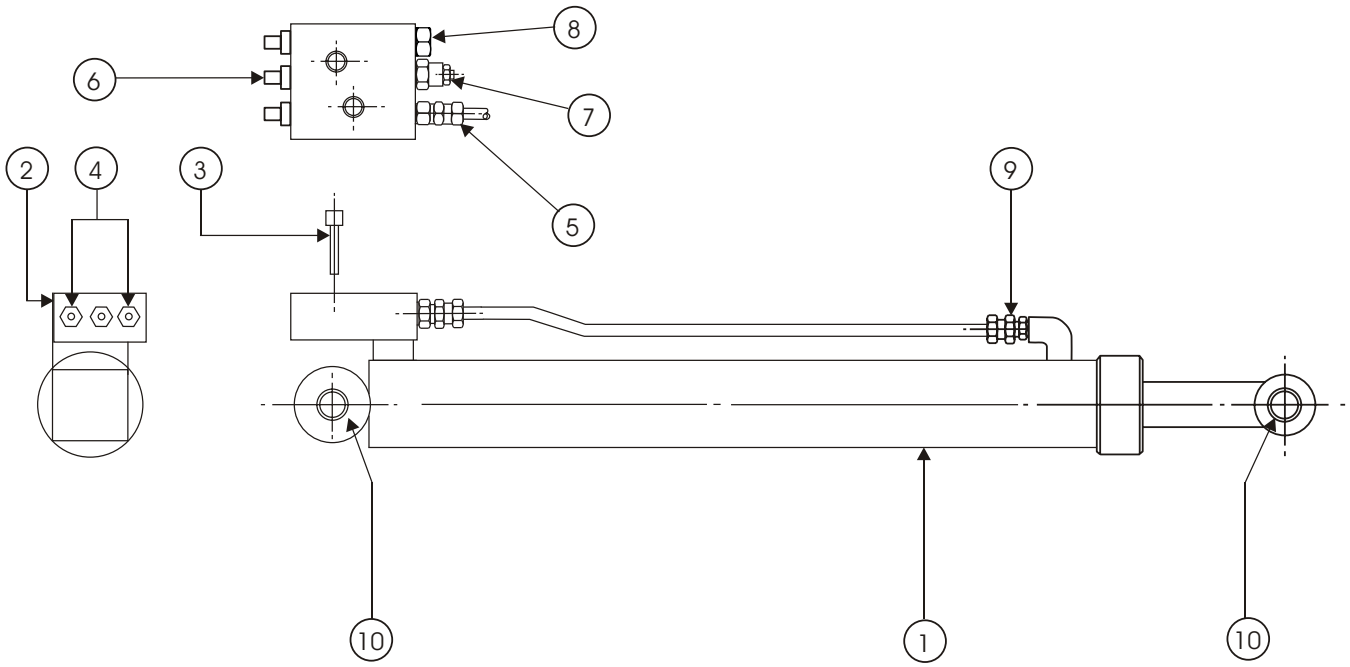

FOOT SWITCH
IF FITTED
COLUMN SPOOL VALVE
SL
LB
UB
T
P
2500 PSI
BASKET SPOOL VALVE
SL
LB
UB
FLY
P
T
2500 PSI
LEG VALVE BANK 11921
LEG 1
LEG 2
LEG 3
LEG 4
T
P
600 PSI
BOOM
DUMP
VALVE
NO
NC
BASE
PLATFORM
SELECT
VALVE
STABILISER
SELECT
VALVE
LWR
CYL
LIFT
PAD
FLY CYLINDER
PAD
LIFT
LOWER
LOWER
CYLINDER
CYL
LOWER
BLEED
0.6
LIFT
UPPER
CYLINDER
1800
PSI
A
B
BR
CW
CCW
SLEW
OVER CENTRE VALVE
10.9M OPTION
KIT IF FITTED
LOWER
BLEED
0.6
LIFT
UPPER
CYLINDER

Item	Part No	Qty	Description
	12377A		Main control valve assembly
1.	11415-1P	1	Stabiliser solenoid
2.	11415-2	1	Flow compensator
3.	11415-3P	1	Main relief valve 2500 psi
4.	11415-4P	1	Solenoid emergency lower
5.	11415-5P	1	Manual emergency lower
6.	11415-6P	1	Check valve 4 psi
7.	11415-77	1	Proportional flow control
8.	11415-8P	1	Control solenoid
9.	11415-9P	1	Solenoid valve, closed centre
10.	11415-10P	4	Solenoid valve, floating centre
11.	11415-6P	1	Check valve 4 psi
12.	11415-11PS	12	Solenoid coil, 12 volt
13.	11415-12	1	Minimum flow setting orifice
14.	11415-12	1	Emergency lowering orifice
15.	10996-1	1	Test point

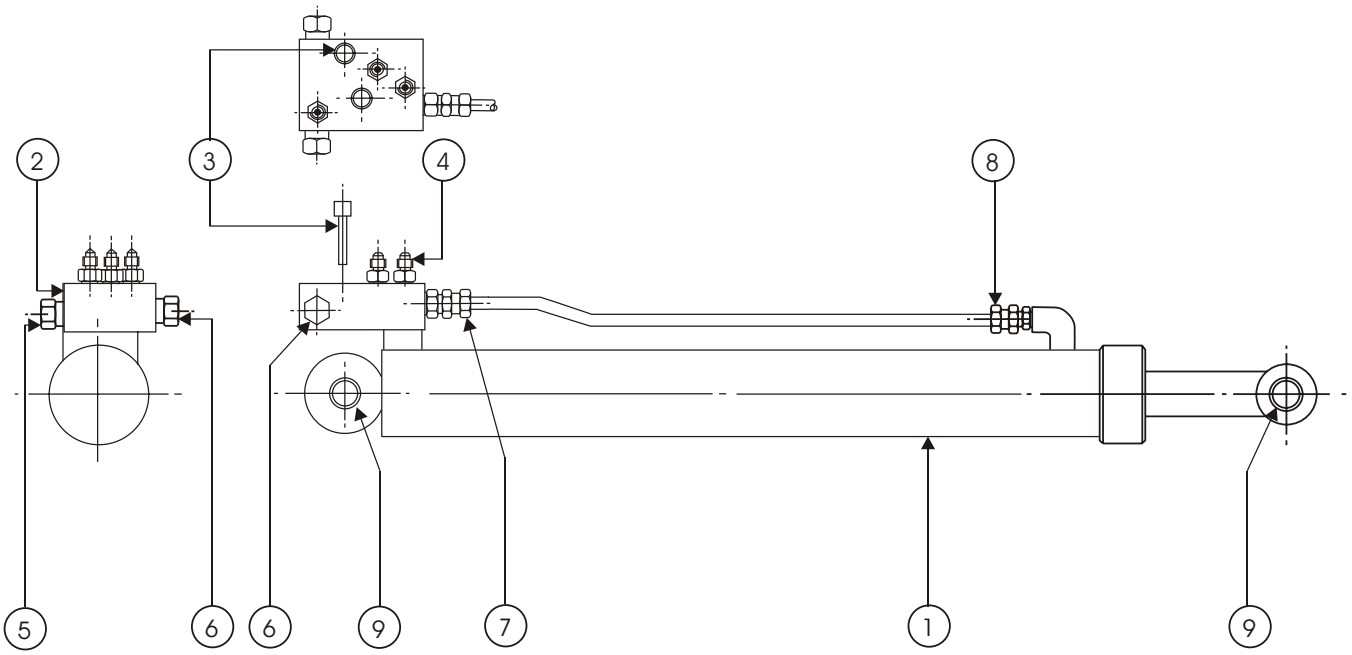


Upper boom lift cylinder assembly

Item	Part No	Qty	Description
1.	1589	1	Lift cylinder, upper
2.	9935	1	Valve, H&L D/A
3.	3613-0804050	2	Cap screw M8 x 50
4.	506-5705	2	Fitting, hydraulic 7/16” x 9/16”
5.	11611-6	1	Fitting, ferrulok
6.	11057-1	1	Check valve, fitting
7.	9935-1	1	Counterbalance cartridge
8.	9405	1	Velocity fuse
9.	11934-6	1	Fitting, ferrulok
10.	3624-11	2	Bush, permaglide
	1589K	1	Seal kit

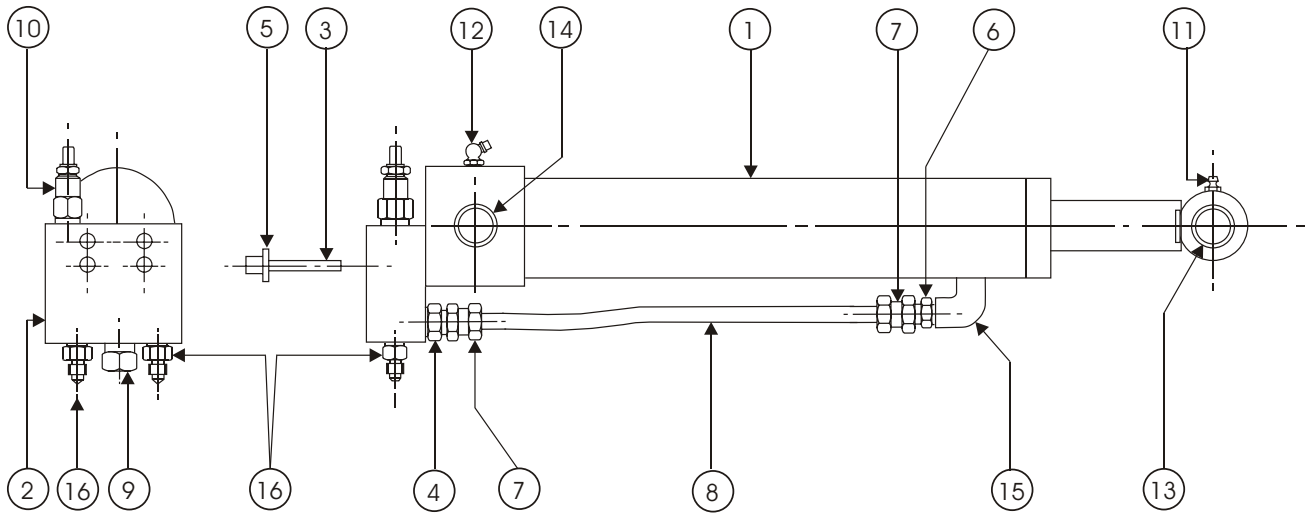


Item	Part No	Qty	Description
1.	9928	1	Lift cylinder, lower
2.	9931	1	Valve, H&L D/A
3.	3613-08040	2	Cap screw M8 x 40
4.	506-5705	2	Fitting, hydraulic 7/16” x 9/16”
5.	9401	1	Counterbalance cartridge
6.	7956	1	Counterbalance cartridge
7.	11611-6	1	Fitting, ferrulok
8.	11934-6	1	Fitting, ferrulok
9.	3624-4	4	Bush, permaglide
	9928K	1	Seal kit

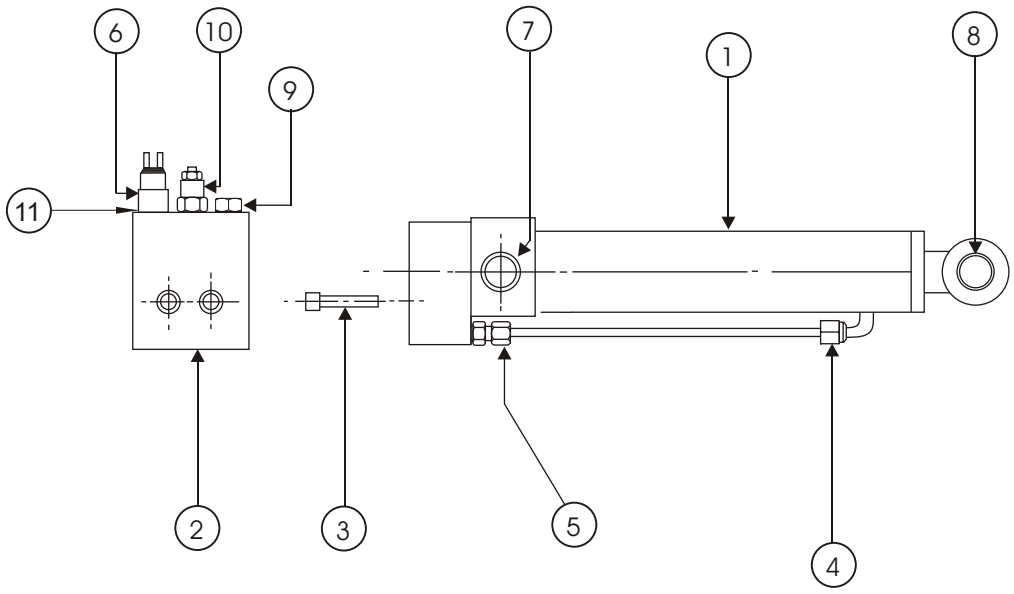


Flyboom cylinder assembly

Item	Part No	Qty	Description
1.	12177	1	Flyboom cylinder assembly
2.	11412-1	1	Relief valve
3.	11367-2	1	Pilot check valve
	12177K	1	Seal kit

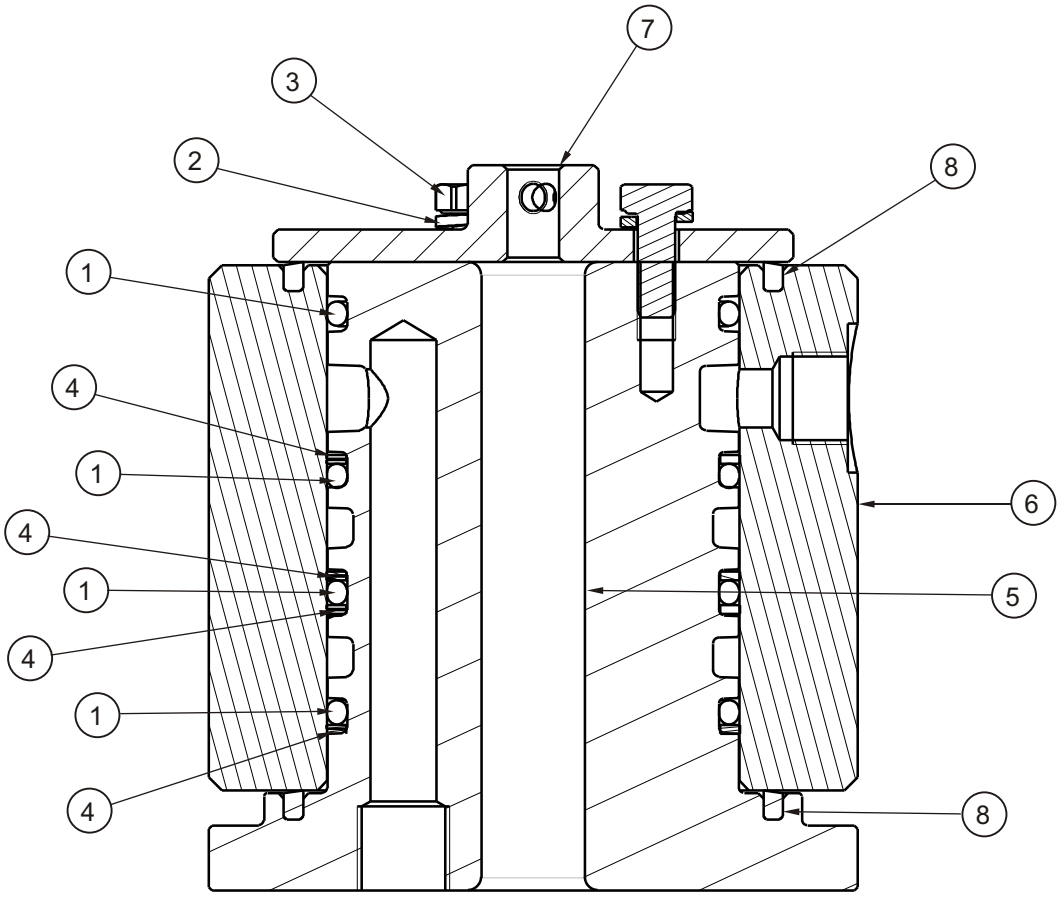


Item	Part No	Qty	Description
1.	10275	1	Cylinder, stabiliser
2.	10286	1	H and L valve, MHP15J Leg
	13656	1	H and L valve, MHP15J Leg from MHP15HD-07-000007 onwards
3.	3613-08040	2	Cap screw M8 x 40
4.	11934-6	1	Fitting, ferrulok
5.	11611-6	1	Fitting, ferrulok
6.	9981	1	Pressure switch, set 400 psi
	9981-4		Pressure switch, set 400 psi from MHP15HD-07-000007 onwards
7.	3624-4	2	Bush, permaglide
8.	3624-18	2	Bush, permaglide
9.	10286-4	1	P.O. Check valve
10.	10286-3	1	Counterbalance valve
11.	7084-005	1	Dowty seal from MHP15HD-07-000007 onwards
	10275K	1	Seal kit

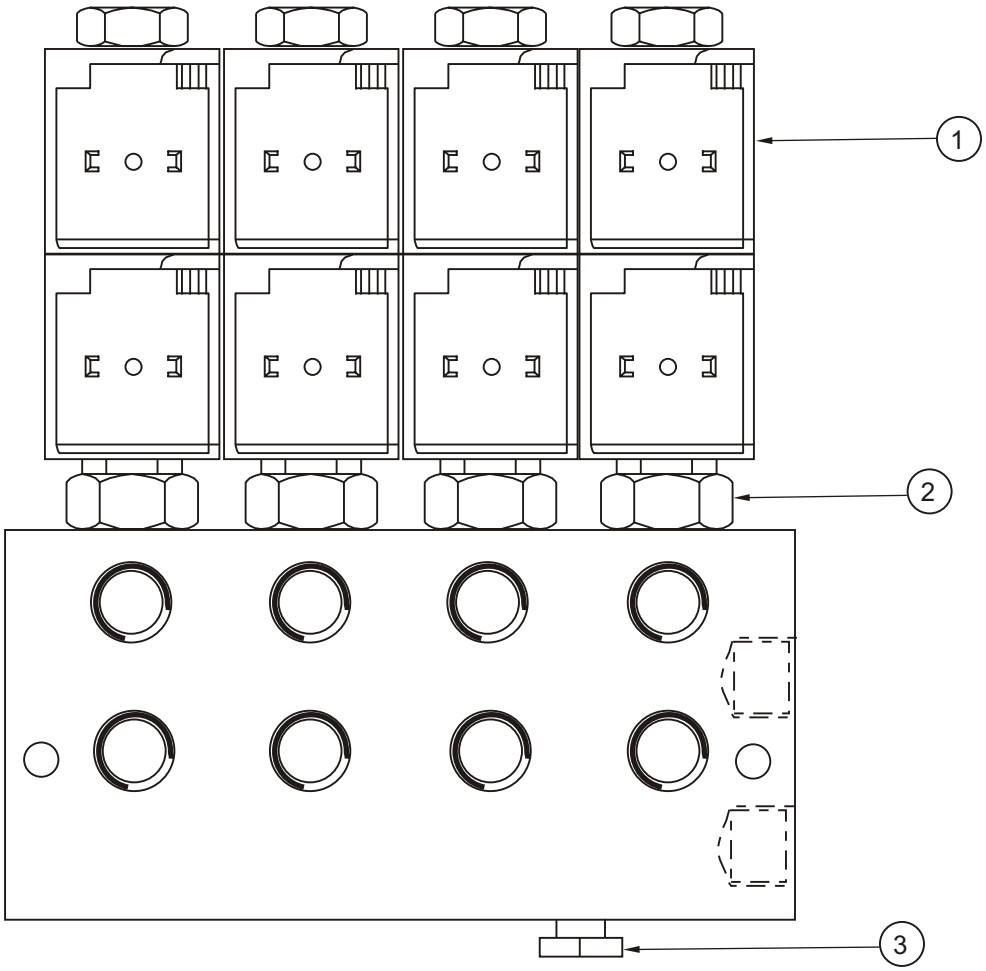


Continuous rotation (option)

Item	Part No	Qty	Description
1.	13-228	4	O-Ring Nitrile 90 DUR
2.	3605-06	3	Spring washer
3.	3610-06016	3	Metric bolt
4.	11768-228	4	PTFE backup washer
5.	11956-1	1	Distributor 3 part pillar
6.	11956-2	1	Distributor barrel
7.	11956-3	1	Distributor cap
8.	11956-5	2	Wiper seal
	11956K	1	Seal kit (includes items 1 & 4)



Item	Part No	Qty	Description
	11921A	Ref	Manifold block assembly
1.	11415-11	8	12V coil
2.	11415-9	4	Valve spool
3.	7034-001	1	Cavity Plug



Section 3. - Electrical

Electrical Circuit Diagram
MHPxxxx

September 3rd 2012

F

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B

A

1 2 3 4 5 6 7 8 9

Left Front Leg SCB
Right Front Leg SCB
Left Rear Leg SCB
Right Rear Leg SCB
Lift Enable SCB
P4-1 P4-2 P4-3 P4-4 P4-5
P1-1 P1-2 P1-4 P1-3 P1-6
P2-1 P2-2 P2-3 P2-4 P2-5 P2-7 P2-8 P3-1 P3-2 P3-3 P3-12 P2-12
P3-4 P3-5 P3-6 P3-7 P3-8 P3-9 P3-10 P3-11
Leg Left Front SCB
Leg Right Front SCB
Auto SCB
Leg Left Rear SCB
Leg Right Rear SCB
Optional: Auto Level
Front Left Up
Front Right Up
Rear Right Up
Rear Left Up
Front Right Down
Front Left Down
Rear Right Down
Rear Left Down

TBM LCB
1 2 3 4
B+ B+ B- B-

E-Stop UCB, C1 NC
Foot Switch
Enable UCB
E-Lower UCB
Choke UCB
Start UCB
Speed Ctrl UCB
Alarm UCB
Overload UCB
Lift Enable UCB
Power Select UCB
Fuel Elec
E-Stop UCB, C2 NC
Optional: Bi-energy units only
Matrix UCB
P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-10 P2-11 P2-9 P4-1 P4-3 P4-5
P1-1 P1-4 P1-3 P1-6
P3-2 P3-1 P3-4 P3-5 P3-6 P3-7 P3-8 P3-9 P3-10
Slew UCB
Lower Boom UCB
Upper Boom UCB
Tele Boom UCB
Basket Rotate UCB

Load Cell
Load Cell Interface UCB
P2-1 P2-2 P2-3 P2-4 P3-1 P3-2 P3-3 P5-2 P5-1 P1-2 P1-1 P4-1 P4-2

CONTACTOR
Motor 24V
24V Isolate 250A 5A
E-Stop LCB, C2 NC
Key Switch LCB, C1 Closed=Platform
Key Switch LCB, C4 Closed=Base
Ign +24V in
Invertor 24V 12V +12V out
Optional: 24VDC units only
12V 10A
E-Stop LCB, C1 NC
Key Switch LCB, C1 Closed=Platform
Key Switch LCB, C4 Closed=Base
Power Select LCB Elec Fuel

Leg Interlock Switches
Closed = Leg Down
Leg Left Front
Leg Right Front
Leg Left Rear
Leg Right Rear
Boom Switch Upper
Activated = Stowed
Boom Switch Lower
Activated = Stowed
Cam LCB
Open = Height Exceeded
Key Lockout LCB
Closed = Lockout Disabled

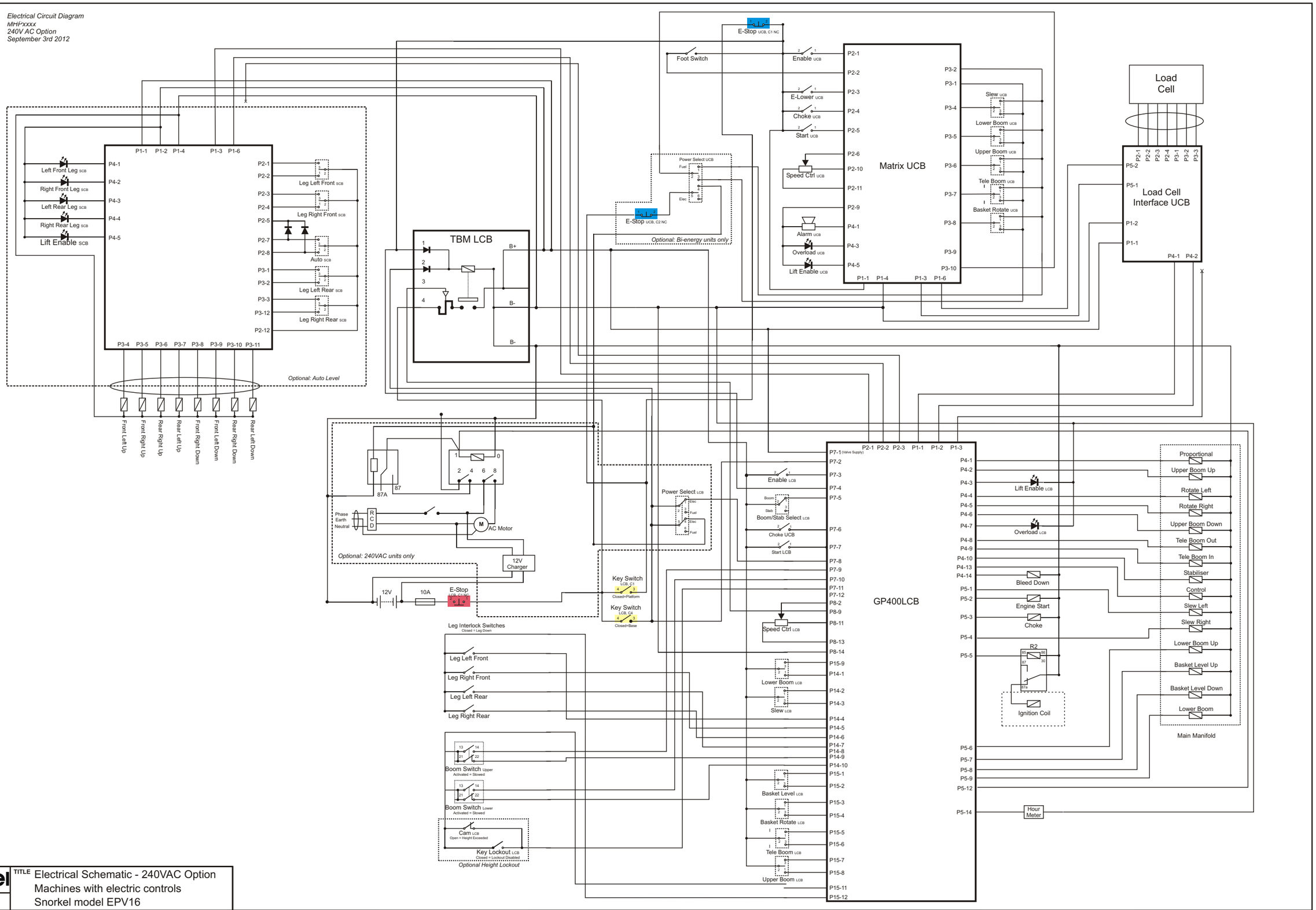
GP400LCB
P7-1 (Valve Supply) P7-2 P7-3 P7-4 P7-5 P7-6 P7-7 P7-8 P7-9 P7-10 P7-11 P7-12 P8-2 P8-9 P8-11 P8-13 P8-14 P15-9 P14-1 P14-2 P14-3 P14-4 P14-5 P14-6 P14-7 P14-8 P14-9 P14-10 P15-1 P15-2 P15-3 P15-4 P15-5 P15-6 P15-7 P15-8 P15-11 P15-12
P2-1 P2-2 P2-3 P1-1 P1-2 P1-3
Enable LCB
Boom Stab Boom/Stab Select LCB
Choke UCB
Start LCB
Speed Ctrl LCB
Lower Boom LCB
Slew LCB
Basket Level LCB
Basket Rotate LCB
Tele Boom LCB
Upper Boom LCB
P4-1 P4-2 P4-3 P4-4 P4-5 P4-6 P4-7 P4-8 P4-9 P4-10 P4-13 P4-14 P5-1 P5-2 P5-3 P5-4 P5-5 P5-6 P5-7 P5-8 P5-9 P5-12 P5-14
Lift Enable LCB
Overload
Bleed Down
Engine Start
Choke
R2
Ignition Coil
Hour Meter

Proportional
Upper Boom Up
Rotate Left
Rotate Right
Upper Boom Down
Tele Boom Out
Tele Boom In
Stabiliser
Control
Slew Left
Slew Right
Lower Boom Up
Basket Level Up
Basket Level Down
Lower Boom
Main Manifold

TITLE Electrical Schematic
Machines with electric controls
Snorkel model EPV16

snorkel

Electrical Circuit Diagram
MHFxxxx
240V AC Option
September 3rd 2012



snorkel	TITLE Electrical Schematic - 240VAC Option Machines with electric controls Snorkel model EPV16
Page 3-4	

F E D C B A

1 2 3 4 5 6 7 8 9

Electrical Circuit Diagram
MHPxxxx
Hydraulic Controls Option
New Emergency Bleed Down
October 10th 2012

Left Front Leg SCB
Right Front Leg SCB
Left Rear Leg SCB
Right Rear Leg SCB
Lift Enable SCB
P1-1 P1-2 P1-4 P1-3 P1-6
P4-1 P4-2 P4-3 P4-4 P4-5
P3-4 P3-5 P3-6 P3-7 P3-8 P3-9 P3-10 P3-11
P2-1 P2-2 P2-3 P2-4 P2-5 P2-7 P2-8 P3-1 P3-2 P3-3 P3-12 P2-12
Leg Left Front SCB
Leg Right Front SCB
Auto SCB
Leg Left Rear SCB
Leg Right Rear SCB
Optional: Auto Level
Front Left Up
Front Right Up
Rear Right Up
Rear Left Up
Front Right Down
Front Left Down
Rear Right Down
Rear Left Down

TBM LCB
1 2 3 4
B+ B+ B- B-

E-Stop UCB, C1 NC
Foot Switch
Enable UCB
E-Lower UCB
Choke UCB
Start UCB
Power Select UCB
Fuel
Elec
E-Stop UCB, C2 NC
Optional: Bi-energy units only
Alarm UCB
Overload
Lift Enable UCB
Matrix UCB
P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-10 P2-11 P2-9 P4-1 P4-3 P4-5
P3-2 P3-1 P3-4 P3-5 P3-6 P3-7 P3-8 P3-9 P3-10
P1-1 P1-4 P1-3 P1-6

Load Cell
Load Cell Interface UCB
P2-1 P2-2 P2-3 P2-4 P3-1 P3-2 P3-3
P5-2 P5-1 P1-2 P1-1 P4-1 P4-2

E Lower LCB
Enable LCB
Power Select LCB
Boom/Stab Select LCB
Choke UCB
Start LCB
Boom
Stab
Elec
Fuel

CONTACTOR
Motor 24V
24V Isolate 250A 5A
E-Stop LCB, C2 NC
Key Switch LCB, C1 Closed=Platform
Key Switch LCB, C4 Closed=Base
Invertor 24V 12V +12V out
Optional: 24VDC units only
12V 10A
E-Stop LCB, C1 NC
Key Switch LCB, C1 Closed=Platform
Key Switch LCB, C4 Closed=Base

Leg Interlock Switches
Closed = Leg Down
Leg Left Front
Leg Right Front
Leg Left Rear
Leg Right Rear
Boom Switch Upper
Activated = Slowed
Boom Switch Lower
Activated = Slowed
Key Lockout LCB C1
Open = Lockout Disabled
Cam LCB
Closed = Height Exceeded
Solenoid
Optional: Height Lockout

P7-1 (Valve Supply) P7-2 P7-3 P7-4 P7-5 P7-6 P7-7 P7-8 P7-9 P7-10 P7-11 P7-12 P8-2 P8-9 P8-11 P8-13 P8-14 P15-9 P14-1 P14-2 P14-3 P14-4 P14-5 P14-6 P14-7 P14-8 P14-9 P14-10 P15-1 P15-2 P15-3 P15-4 P15-5 P15-6 P15-7 P15-8 P15-11 P15-12

GP400LCB

P2-1 P2-2 P2-3 P1-1 P1-2 P1-3
P4-1 P4-2 P4-3 P4-4 P4-5 P4-6 P4-7 P4-8 P4-9 P4-10 P4-13 P4-14 P5-1 P5-2 P5-3 P5-4 P5-5 P5-6 P5-7 P5-8 P5-9 P5-12 P5-14

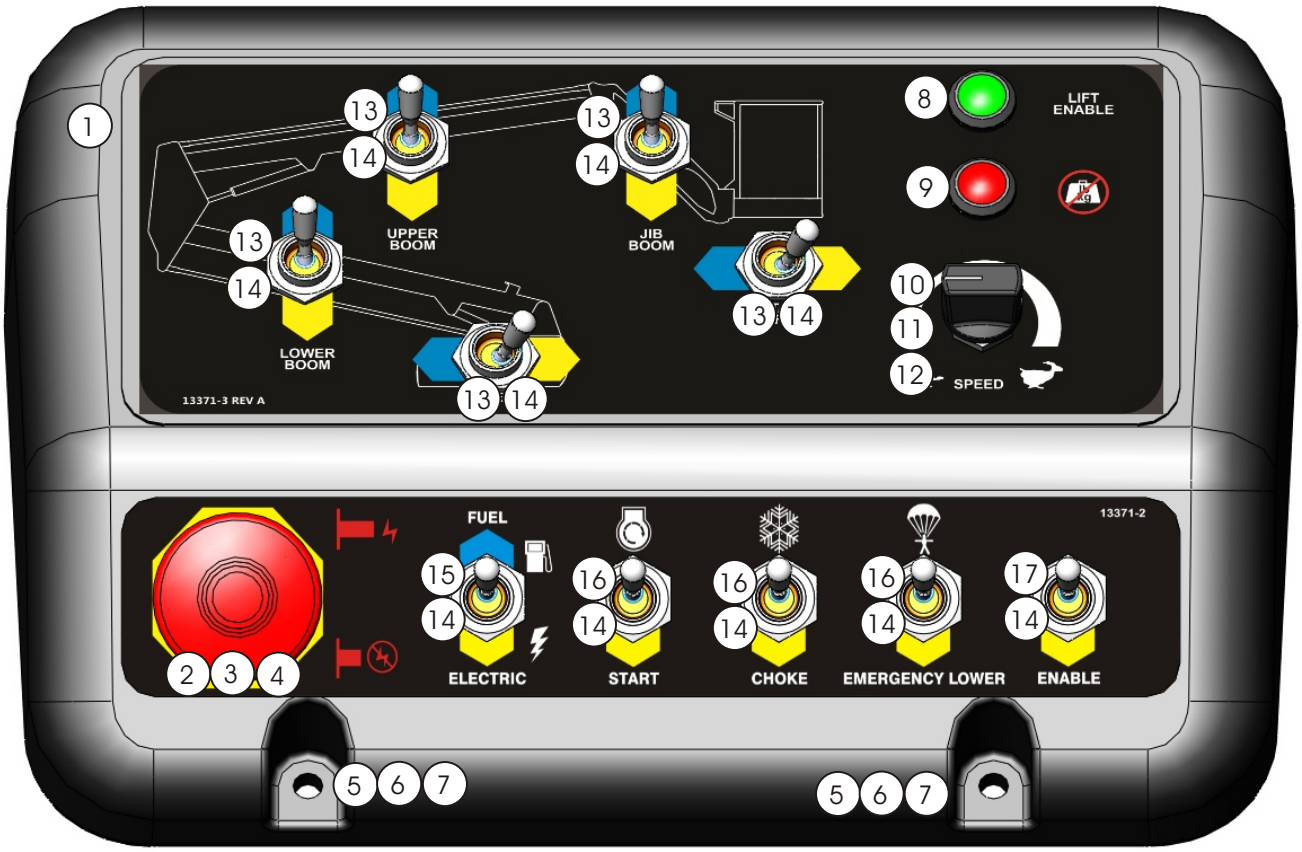
Stabiliser
Control
Lift Enable LCB
Overload
Base
Engine Start
Choke
Bleed Down coils On upper lift cylinders
R2
Ignition Coil
Hour Meter

TITLE Electrical schematic
Machines with hydraulic controls
Snorkel model EPV16

snorkel

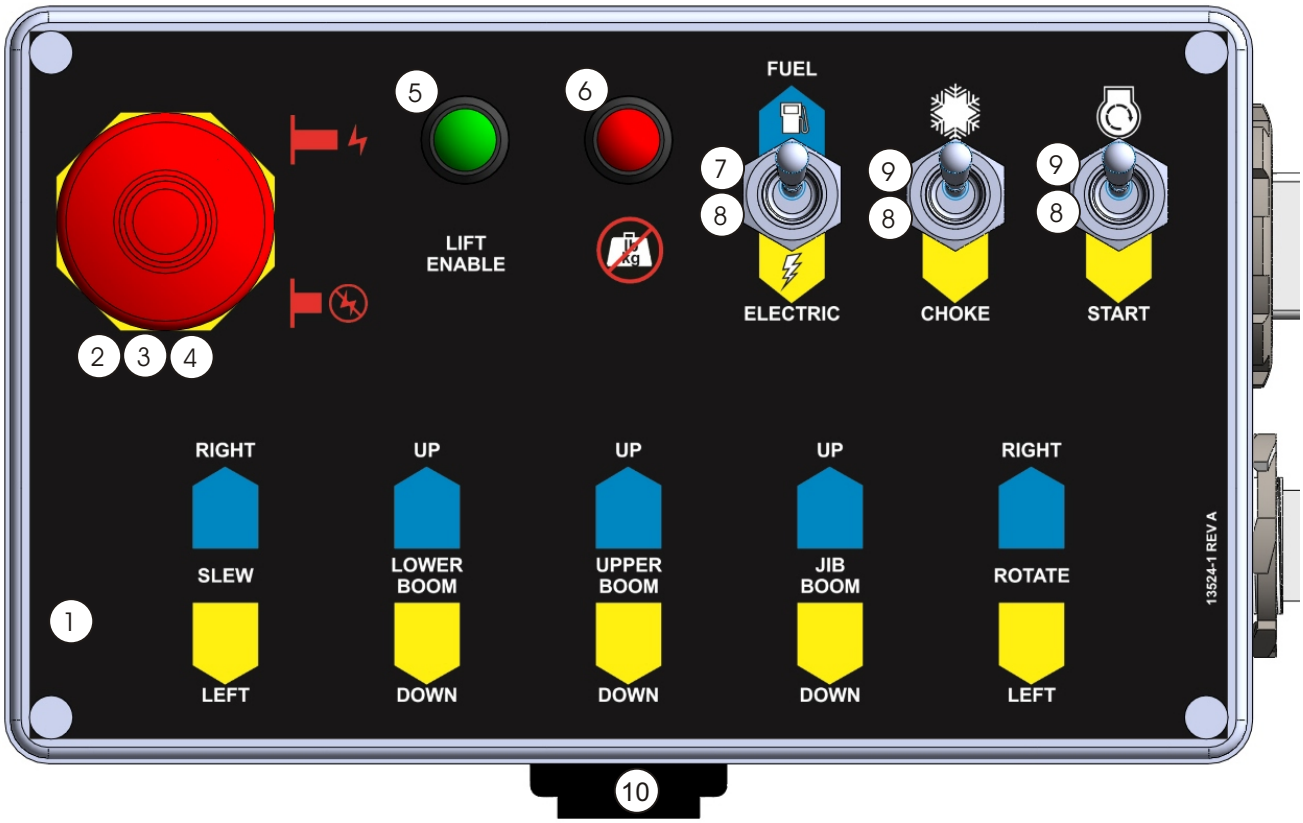
9 8 7 6 5 4 3 2
F E D C B A

Item	Part No.	Qty	Description
	13488A		Upper control box assembly
1.	13251-1	1	Control Box
2.	9775	1	Emergency stop switch, pull release
3.	13380	1	Collar
4.	10118	1	Contact, normally closed
5.	3604-05020	2	Screw, pan head, M5 x 20
6.	3605-05	2	Washer, spring, M5
7.	3603-06	2	Washer, flat, M6 x 16
8.	12536-3	1	LED, 12V, green, 10mm lens
9.	12536-4	1	LED, 12V, red, 10mm lens
10.	13489-1	1	Knob, speed control
11.	13489	1	Rheostat
12.	12516	1	Washer, M10, rubber
13.	302-0018	5	Switch, toggle, DPDT (M/OFF/M)
14.	12515	10	Washer, M12, rubber
15.	302-0097	1	Switch, toggle, DPDT (ON/ON)
16.	302-0015	3	Switch, toggle, SPST (MON/OFF)
17.	3020081	1	Switch, toggle, SPST (MON)
18.	1815-1	1	Cable gland, M32, nylon (not shown)
19.	12416	1	Hinge, (not shown)
20.	12408	1	Rubber seal, (not shown)

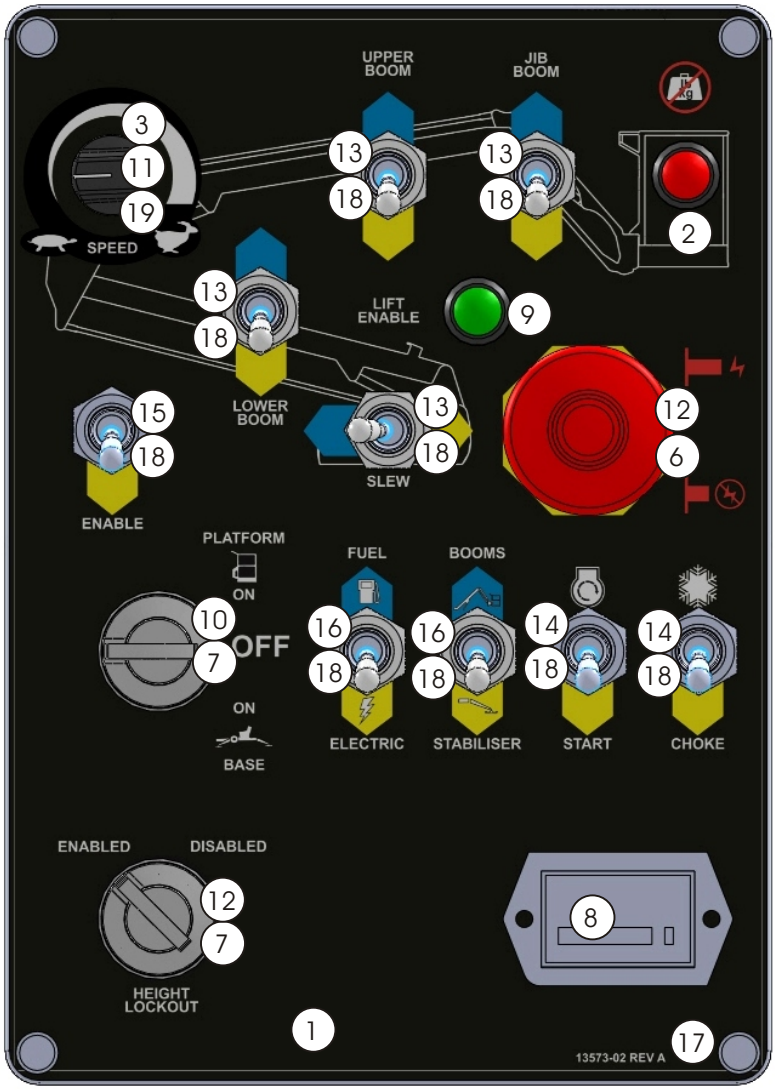


Upper control box assembly - hydraulic controls

Item	Part No.	Qty	Description
	13586A		Upper control box assembly
1.	13586-1	1	Decal, upper control box, hydraulic controls
2.	9775	1	Emergency stop switch, pull release
3.	10118	1	Contact, normally closed
4.	13380	1	Collar
5.	12536-3	1	LED, 12V, green, 10mm lens
6.	12536-4	1	LED, 12V, red, 10mm lens
7.	3020097	1	Switch, toggle, (ON/OFF)
8.	12515	1	Washer, M12, rubber
9.	302-0015	2	Switch, toggle, SPST, (MON/OFF)
10.	304-0411	1	Alarm buzzer

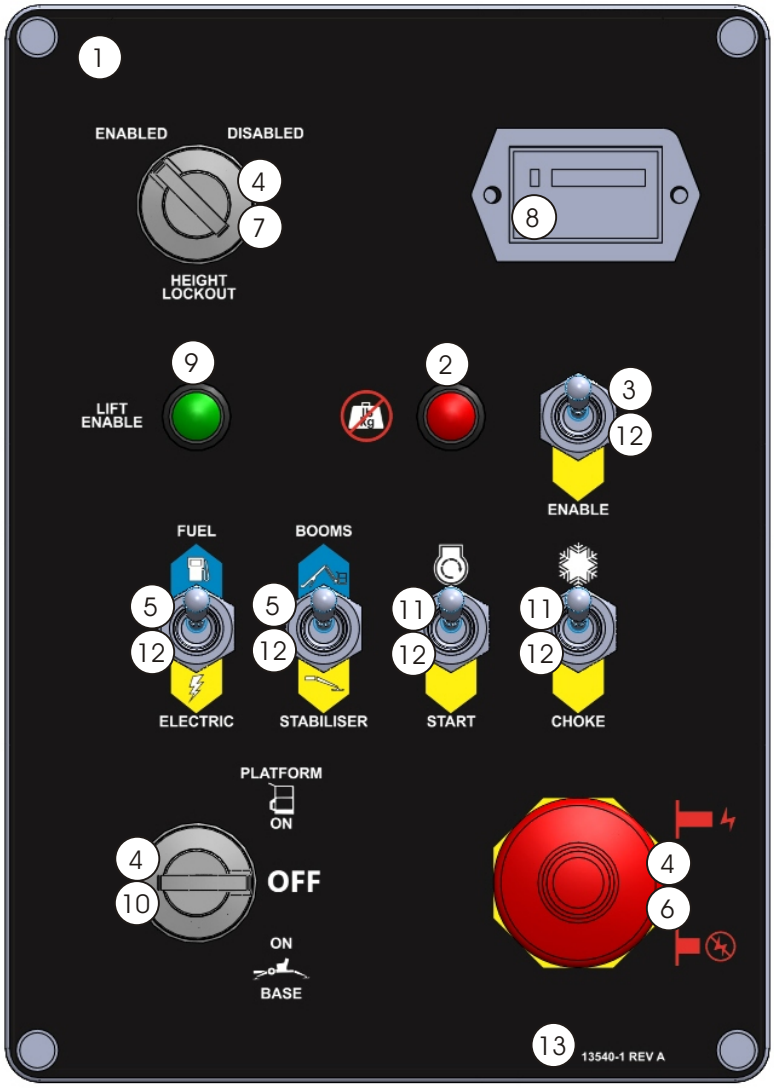


Item	Part No.	Qty	Description
	13573A	1	Lower control box assembly
1.	12521-1	1	Control box, lower
2.	12536-4	1	LED, 12V, red
3.	13489-1	1	Knob, speed control switch
4.	1814	3	Cable gland (not shown)
5.	1815	1	Cable gland (not shown)
6.	9775	1	Stop switch head
7.	10744	1	Key switch
8.	455186	1	Hourmeter
9.	12536-3	1	LED, 12V, green
10.	13456	1	Key switch
11.	13489	1	Rheostat
12.	9776	2	Collar and contact block
13.	302-0018	4	Switch,toggle, DPDT (M/OFF/M)
14.	302-0015	2	Switch, toggle, SPST (MOM/OFF)
15.	302-0018	1	Switch, toggle, SPST (MON)
16.	302-0097	2	Switch, toggle, DPDT (ON/ON)
17.	13573-02	1	Decal, lower control box
18.	12515	9	Washer, M12, rubber
19.	12516	1	Washer, M10, rubber

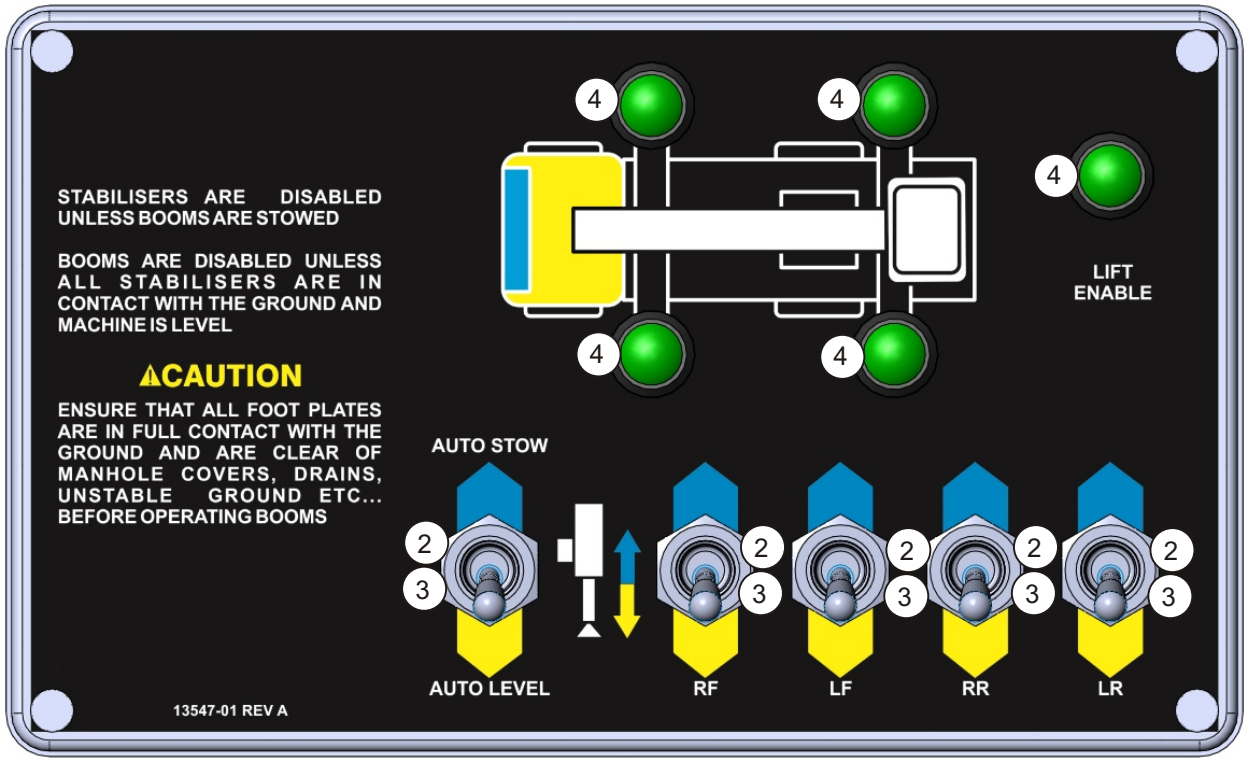


Lower control box assembly - hydraulic controls

Item	Part No.	Qty	Description
	13540A	1	Lower control box assembly
1.	12521	1	Control box, lower
2.	12536-4	1	LED, 12V, red
3.	302-0018	1	Switch, toggle, SPST (MOM)
4.	9776	2	Collar and contact block
5.	302-0097	2	Switch, toggle, DPDT (ON/ON)
6.	9775	1	Stop switch head
7.	10744	1	Key switch
8.	455186	1	Hourmeter
9.	12536-3	1	LED, 12V, green
10.	13456	1	Key switch
11.	302-0015	1	Switch, toggle, SPST (MON/OFF)
12.	12515	5	Washer, M12, rubber
13.	13540-1	1	Decal, lower control box



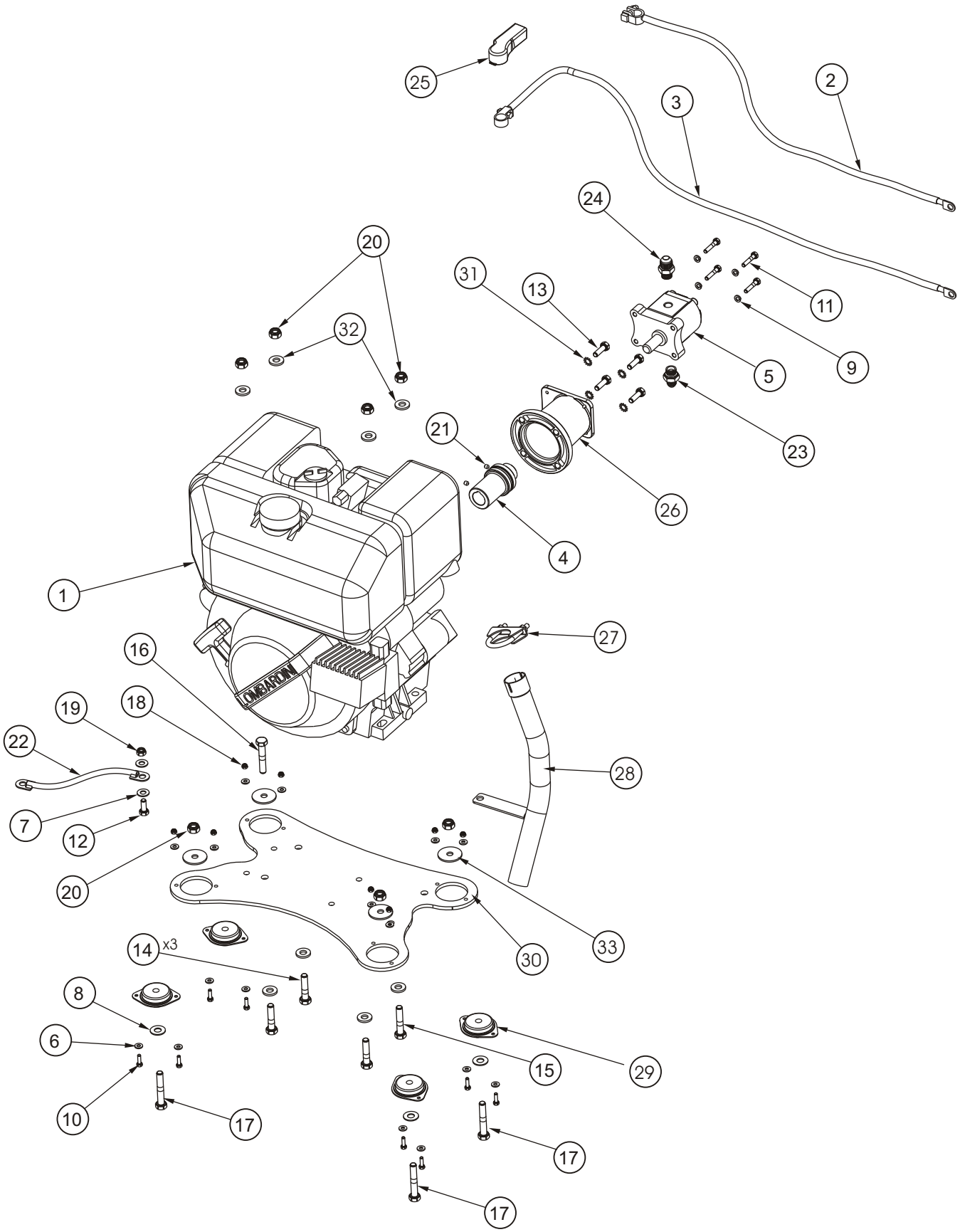
Item	Part No.	Qty	Description
	13547A	1	Control box assembly, auto stabiliser
1.	13547	1	Control box
2.	302-0015	5	Switch, toggle, SPST (MON/OFF)
3.	12515	5	Washer, M12, rubber
4.	12536-3	5	LED, 12V green



Section 4. - Options

Engine assembly, Lombardini (Sheet 1)

Item	Part No	Qty	Description
0.	12449		Engine assembly
1.	1171-8	1	Lombardini 15LD315 diesel engine
2.	1650-030	1	Battery cable
3.	1650-031	1	Battery cable
4.	1657-11	1	Drive coupling
5.	1659	1	Gear pump
6.	3603-05	16	Plain washer
7.	3603-08	2	Plain washer
8.	3603-10	3	Plain washer
9.	3605-06	4	Spring washer
10.	3610-05016	8	Metric bolt
11.	3610-06030	4	Metric bolt
12.	3610-08020	1	Metric bolt
13.	3610-08025	4	Metric bolt
14.	3610-10045	3	Metric bolt
15.	3610-10050	1	Metric bolt
16.	3610-10055	1	Metric bolt
17.	3610-10060	3	Metric bolt
18.	3611-05	8	Nyloc nut
19.	3611-08	1	Nyloc nut
20.	3611-10	7	Nyloc nut
21.	3612-06006	2	Grub screw
22.	3649-10	1	Battery cable
23.	7013-003	1	BSPP (Dowty) x JICM nipple
24.	7013-004	1	BSPP (Dowty) x JICM nipple
25.	10254	1	Cover, battery terminal
26.	10417	1	Bell housing
27.	12409	1	Exaust clamp
28.	12450	1	Exhaust weld, Lombardini
29.	12524	4	Engine mount
30.	12526	1	Engine mount plate
31.	60005-054	4	Lockwasher
32.	60030-061	8	Washer, heavy duty
33.	5560179	4	Flat washer, special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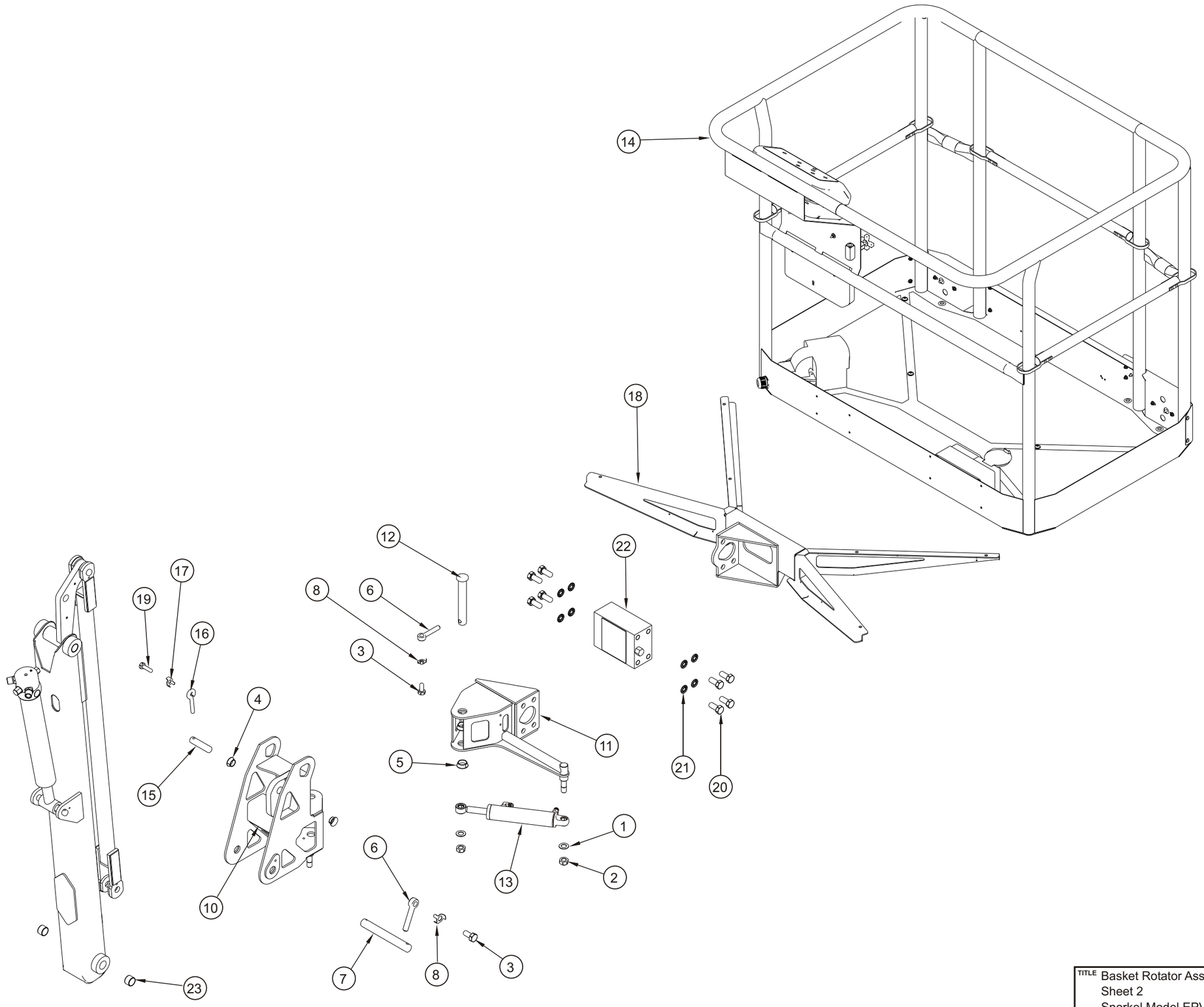
Basket rotator (Sheet 1)

Item	Part No	Qty	Description
0.			Basket rotator assembly
1.	3603-16	2	Washer, plain
2.	3608-16C	2	
3.	3610-10020	2	Bolt, metric
4.	3626-13	2	Permaglide bush, flanged
5.	3626-5	2	Permaglide bush, flanged
6.	8626	2	Pin keeper
7.	9790	1	
8.	11492-3	2	Washer, tab
9.	12880	1	
10.	13563-1	1	Rotator half, jib
11.	13563-2	1	Rotator half, basket
12.	13570	1	Pin, 25 x 176, stepped pin
13.	12330A	1	Basket assembly
14.	13484A	1	Basket assembly
15.	9859		Pin
16.	8628		Pin keeper
17.	11492-1		Washer, tab
18.	13497		Basket bottom mount
19.	3610-06020		Bolt, metric
20.	3617-16035		Bolt, metric
21.	3631-16		Washer, nord lock
22.	13468		Load cell
23.	3624-3		Bush, permaglide

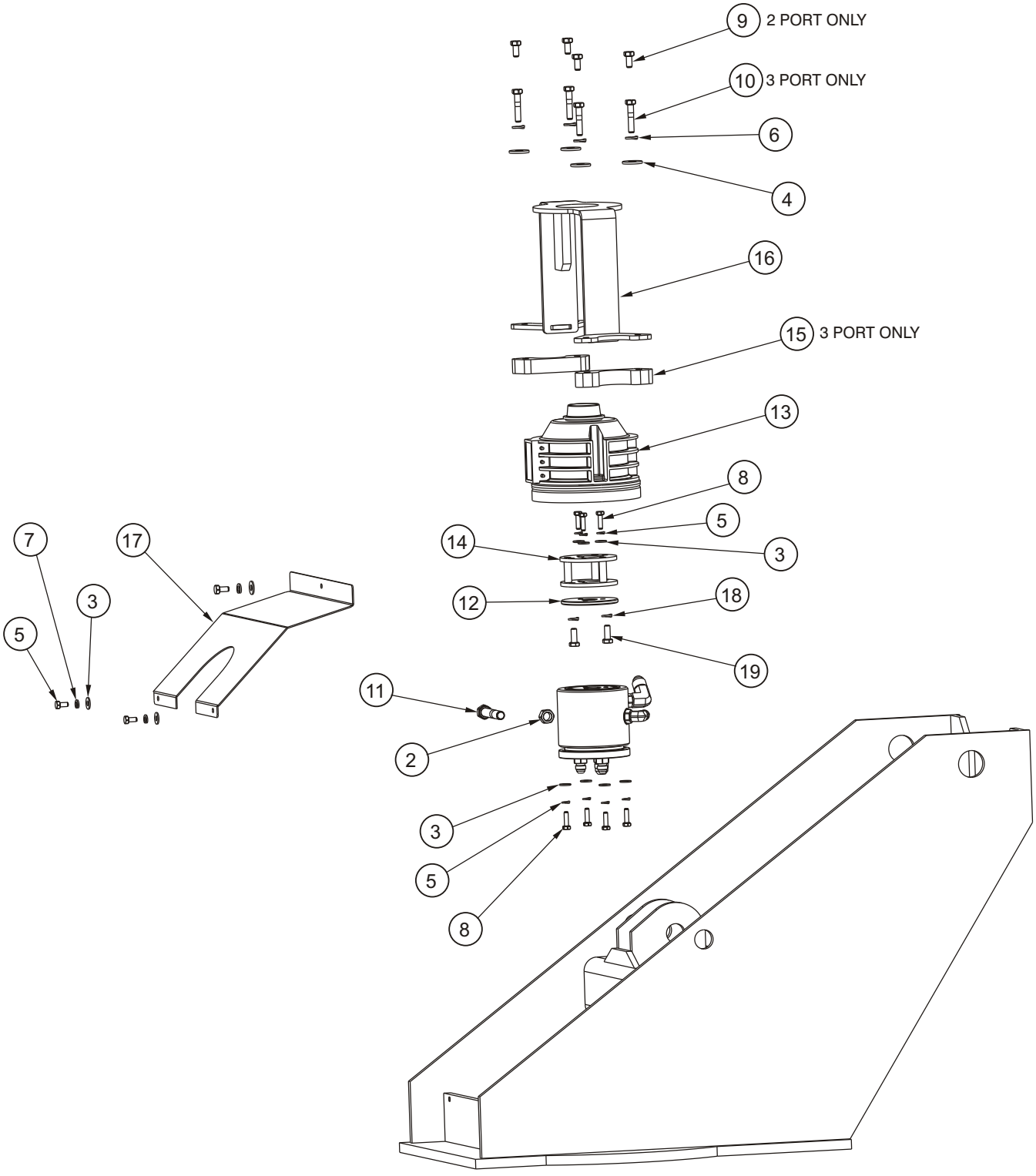


TITLE Basket Rotator Assembly
Sheet 2
Snorkel Model EPV16

Snorkel

Continuous rotation option (sheet 1)

Item	Part No	Qty	Description
1.	506-5707	5	Fitting, hydraulic (not shown)
2.	3602-12	1	Metric hex nut
3.	3603-06	10	Plain washer
4.	3603-08	4	Plain washer
5.	3605-06	10	Spring washer
6.	3605-08	4	Spring washer
7.	3610-06012	3	Metric bolt
8.	3610-06020	7	Metric bolt
9.	3610-08016	4	Metric bolt
10.	3610-08040	4	Metric bolt
11.	3610-12075	1	Metric bolt
12.	11957-3	1	Distributor cap
13.	12679	1	Hydromotion 12 way slip ring
14.	12679-20	1	Spacer plate
15.	12679-50	2	Three port spacer plate
16.	12679-55	1	Moving bracket
17.	12679-60	1	Column cover
18.	60005-008	2	Spring washer
19.	60016-003	2	Bolt, 5/16" x 3/4"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3 PORT ONLY
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Parts index - Page locator

Product Warranty

1) Snorkel warrants each new machine manufactured and sold by it to be free from defects in material and workmanship for a period of one (1) year from date of delivery to a Customer. The warranty will apply subject to the machine being operated in accordance with the rules, precautions, instructions and maintenance requirements outlined in the Snorkel Operator and Parts/Service manual.

2) Snorkel further warrants the structural components, specifically the mainframe chassis, turntable, booms and/or scissor arms of each new machine manufactured by it to be free from defects in material and workmanship for an additional period of four (4) years. Any such part or parts which, upon examination by the Snorkel Warranty department, are found to be defective will be replaced or repaired by Snorkel through its local Authorised Dealer. The structural warranty specifically excludes adverse affects on the machine structure arising from damage, abuse or misuse of the equipment.

3) Machines may be held in an authorised Distributor stock for a maximum of six (6) months from the date of shipment from Snorkel, before the warranty period is automatically initiated.

4) It is the responsibility of the Distributor to complete and return a Pre delivery /Warranty registration, before the act of rental / loan / demonstration of the machine or delivery to an end user.

5) The Customer and Dealer shall not be entitled to the benefits of this warranty and Snorkel shall have no obligations here under unless the "Pre-Delivery and Inspection Report" has been properly completed and returned to the Snorkel Warranty department within ten (10) days after delivery of the Snorkel product to the Customer or Dealer's demonstration / rental fleet. Snorkel must be notified, in writing, within ten (10) days, of any machine sold to a Customer from a Dealer's rental fleet during the warranty period.

6) Any part or parts which upon examination by the Snorkel Product Support Department are found to be defective within the specified warranty period, will be replaced or repaired at the sole discretion of Snorkel, through its local Authorised Distributor, at no charge.
Any parts replaced under warranty must be original Snorkel parts obtained through an authorised Snorkel Distributor unless expressly agreed otherwise in writing and in advance by Snorkel's warranty department.

7**)** All parts being claimed under warranty must be held available for return and inspection upon request for a period of 90 days from date of claim submission, it is necessary that all parts are individually tagged or marked with their part number and the warranty claim number. After 90 days all parts replaced under warranty which have not been returned to Snorkel should be destroyed. Failure to produce parts requested by the Warranty Administrator for inspection within a period of 14 days will result in the claim being automatically rejected in full. Materials returned for warranty inspection must have the following procedure :

- Carefully packaged to prevent additional damage during shipping
- Drained of all contents and all open ports capped or plugged
- Shipped in a container tagged or marked with the RMA number
- Shipped PREPAID. Any item(s) returned for warranty by any other means maybe refused and returned, unless prior approval is agreed with Snorkel.

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Product Warranty

8**)** At the direction of the Snorkel Warranty department, any component part (s) of Snorkel products to be replaced or repaired under this warranty programme must be returned freight prepaid for inspection.
An RMA (Returns material authorisation) must be requested from Snorkel Warranty department, a copy to be placed with the returning component part(s)

9) All warranty replacement part will be shipped freight prepaid (standard charge) from the Snorkel Parts Service Department or from the Vendor to Dealer or Customer.

10) All warranty claims are subject to approval by Snorkel Service department. Snorkel reserves the right to limit or adjust claims with regard to defective parts, labour or travel time based on usual and customary guidelines.

REPLACEMENT PARTS WARRANTY

Any part replaced under this limited warranty is not subject to further warranty cover beyond the normal warranty period of the machine upon which the part was installed.

Any replacement parts sold (not delivered under a warranty claim) will be subject to a warranty period of (6) six months from the date of invoice.

Parts held by a Distributor are covered under warranty for a period of (12) twelve months from the date of invoice, provided that those parts have been subject to appropriate storage to prevent damage and deterioration.

CLAIM PROCEDURE

The Snorkel Warranty department must be notified within (48) forty-eight hours of any possible warranty situation during the applicable warranty period. Personnel performing major warranty repair or parts replacement must obtain specific approval by the Snorkel Warranty department prior to performing the warranty repair or replacement.

When a Distributor / Customer perceive a warranty issue to exist the following steps must be adhered to:

All warranty claims must be submitted within 30 days of the date of the machine repair

All correspondence in respect of the claim to be on an official Snorkel warranty claim form as supplied by Snorkel's warranty department

Allocate a warranty claim number to the repair

Place a purchase order for genuine Snorkel replacement parts

Snorkel to dispatch parts via the requested method (in line with the required response time)

Confirmation that a qualified technician is available to replace the part and that this person has been accepted by Snorkel to carry out such work under the warranty of the machine. Failure to do this may nullify the warranty.

FREIGHT DAMAGE

If a machine is received in a damaged condition, then the damage must be noted on the bill of lading and /or delivery documents and if possible photographs taken, prior to signing acceptance of the consignment.
The freight company must be contacted by the Distributor and a damage claim registered immediately.

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Product Warranty

THIS WARRANTY EXCLUDES AND SNORKEL DOES NOT WARRANT:

1. Engines, motors, tyres and batteries are manufactured by suppliers to Snorkel, who furnish their own warranty. Snorkel will, however, to the extent permitted; pass through any such warranty protection to the Distributor / Customer.
2. Any Snorkel product which has been modified or altered outside Snorkel factory without Snorkel written approval, if such modification or alteration, in the sole judgment of Snorkel Engineering and/or Service Departments, adversely affects the stability, reliability or service life of the Snorkel product or any component thereof.
3. Any Snorkel product which has been subject to misuse and abuse, improper maintenance or accident. "Misuse" includes but is not limited to operation beyond the factory-rated load capacity and speeds. "Improper maintenance" includes but is not limited to failure to follow the recommendations contained in the Snorkel Operation, Maintenance, and repair Parts Manuals.
4. Normal wear of any Snorkel component part(s). Normal wear of component parts may vary with the type, application or type of environment in which the machine may be used; such as, but not limited to sandblasting applications
5. Routine maintenance, routine maintenance items and minor adjustments are not covered by this warranty, including but not limited to hydraulic fluid, filters and lubrication, paint and decals.
6. Any Snorkel product that has come into direct contact with any chemical or abrasive material.
7. Incidental or consequential expenses, losses, or damages related to any part or equipment failure, including but not limited to freight cost to transport the machine to a repair facility, downtime of the machine, lost time for workers, lost orders, lost rental revenue, lost profits, expenses or increased cost. This warranty is expressly in lieu of all other warranties, representations or liabilities of Snorkel, either expressed or implied, unless otherwise amended in writing by Snorkel
8. Snorkel Warranty policy does not cover any duties, taxes, environmental fees including without limitation, disposal or handling of tyres, batteries and petrochemical items.
9. Item specifically excluded are, fuel injectors, motor brushes, glow plugs, contactor tips and springs, oil filters, lamp bulbs, lamp lenses, o rings, coolants, lubricants and cleaning material.
10. Failure of replacement parts due to fault misdiagnosis or incorrect fitting by the Distributor / Customer

SNORKEL MAKES NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THIS LIMITED WARRANTY SNORKEL MAKES NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO INJURY TO PERSONS OR PROPERTY.

The Customer shall make all warranty claims through its local Authorised Dealer and should contact the Dealer from whom the Snorkel product was purchased for warranty service. Or, if unable to contact the Dealer, contact the Snorkel Service Department for further assistance

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Product Warranty

APPEAL

The buyer may appeal in writing against a rejected or adjusted claim to Snorkel warranty department within a period of 21 days of receiving the rejection or adjustment notice. The appeal should be grounded on express reasons and supported by relevant evidence. Appeals received outside of this time limit will not be considered.

WARRANTY SCHEDULE

Limited Warranty Periods

Item	Warranty Period
New machine materials and workmanship	**I year parts replacement**
Structural components (Chassis, Turntable, Booms, Scissors)	**5 years parts replacement or repair**
Parts held in a Distributor's stock	**12 months from date of invoice**
Parts sold (non warranty)	**6 months from date of invoice**
Batteries	**6 months from warranty registration date**
Other specifically excluded parts: **Fuel injectors** **Motor brushes** **Glow plugs** **Contactor tips and springs** **Oils** **Filters** **Lamp bulbs** **Lamp lenses** **'O' rings** **Coolants** **Lubricants** **Cleaning materials**	**Not covered by Warranty**

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Local Distributor / Lokaler Vertiebshändler / Distributeur local
El Distribuidor local / Il Distributore locale

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